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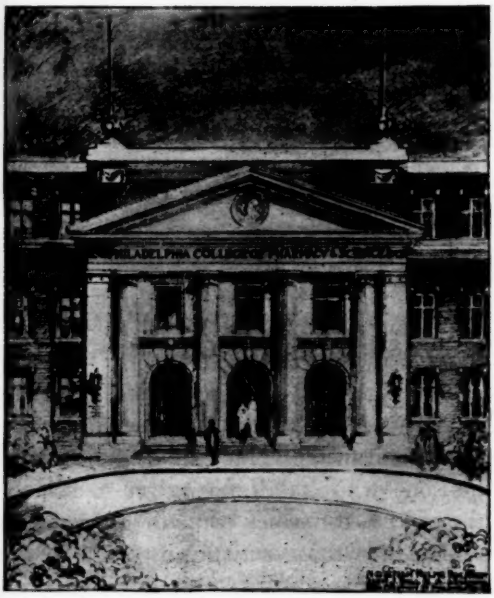
THE AMERICAN
JOURNAL OF PHARMACY

VOL. 99 JUNE, 1927 No. 6

EDITORIAL

THE "NEW" PHILADELPHIA COLLEGE OF PHARMACY AND SCIENCE

THE IMPRESSIVE and dignified ceremony of laying the cornerstone of the already towering buildings of the "New" Philadelphia College of Pharmacy and Science is over.



Front Elevation of New College Buildings.

It was an event of thrilling significance—of blessed recompense to those who wrought so well to make the new development possible—and of signal promise to friends and wellwishers of the fine old institution that has become so integral a part of Philadelphia history.

But it was an event, too, that conjured poignant memories.

For with all the thrill of knowing its newness—and of the greater possibilities of its expanded program and in spite of the knowing that the more commodious and more elaborate quarters would have it better serving its educational purpose—there was a sadness with the thought of leaving the old and the beloved Halls on Tenth Street.

For it was there that we—younger and older graduates—had sat at the feet of our fathers.

For it was there that Maisch and Proctor, Trimble and Bridges—Remington and Sadtler—Kraemer and Lowe—the beloved masters—all had walked and talked and breathed their living inspiration into the hearts and minds of us—the then eager, inexperienced youths.

Blessed be the memories of these—our old masters.

It is said that times have changed—that speed and specialization—in these, the days of the whirlwind—have slaughtered sentiment.

But it is our hope and our prayer—that the intimate—beneficent sentiment and spirit of the "old" institution be transfused without loss into the "new" so it may still better serve its purpose.

For us today—graduates of the old institution—is the fond memory of the crumbling edifice—our old home—but also the great glory of the New Institution whose walls rise up in beauty on another site and the still greater glory that is in its promise of a more abundant service to the Profession and to the Public it has so long and so honorably served.

IVOR GRIFFITH.

SELECTED EDITORIAL

HEARTLESSNESS OF SCIENCE*

THOSE WHO compile military history are not necessarily soldiers. Sometimes the civilian onlooker can take a more comprehensive view of a campaign than can the immediate actors therein.

In like manner, perhaps, one who stands no nearer to science than do I can see some of the objects for which some of her votaries are searching even more clearly than those actually involved in the turmoil. Pure science is now reaching toward subjects once dominated empirically by our members. She is seeking by her own methods to elevate the "scientific" side of pharmacy instruction. In the accomplishment of this end men who have never been educated as pharmacists may, unintentionally, find it necessary to help crush our colleges of pharmacy.

*Reprinted from the *Eclectic Medical Journal*. Written several decades ago. —*J. U. L.*

It seems to some of us that science, in seemingly usurping affairs that we once considered inherent in the sphere of pharmacists, is but doing her duty. The scientific side of our art belongs to science. When the university has at last displaced or dominated the colleges of pharmacy in our land it will, in return, give a more "scientific" course of instruction, as a rule, than apothecaries who teach in these institutions are in a position to furnish. We who work in business lines, and also teach in colleges of pharmacy, bear the same relationship to trained men of science that the home guard does to trained soldiers, and we must at last succumb to those who make science a specialty—who have no outside cares. This is not a pleasant reflection. Many who advocate a cause and then experience the systematic attacks of science are prone to take the onslaught upon their cherished traditions or antiquated possessions as a personal matter, and to feel that science has a grudge against themselves personally while aiming to prosecute those outside her fold. This is an error, for science bears neither love nor hatred towards any being and makes no distinctions between individuals, stepping in the trend of her evolution as indifferently on the shortcomings of her own followers as on outsiders. Science is not heartless, but, in seeking the truth, she spares neither friend nor foe. She is not vindictive. The great cause, Science, is not responsible for the littleness of men who cling to her skirts and claim to speak in her behalf; who thrust their own narrow, peevish selves into her company and vent their spleen in petty actions or in spiteful language from which a true man of science would recoil as a mother shrinks from an unclean word. Science is neither abusive nor heartless, and asks no man to distress a brother human, to tell an untruth, or to write a libel. If science crushes the druggist teacher, it will be to the better serving of those who seek knowledge.

The Trend of Science.—In some portions of Mexico the people rent the right to bury their dead, retaining the franchise of the grave but a few years. In temporary receptacles the loving mother deposits the body of her child, or the child that of its parent. When the period of possession has passed (five or ten years, perhaps) the bones are scraped out and thrown together into a common receptacle, perhaps a hillside cave, where may be piled thousands of like relics. It may be truly said—

"Here the matron and the maid
In one common bed are laid."

Once more the old grave is rented, and a newly sorrowing humanity weeps over the memory of those whose destiny is irrevocably that common end—the bone-pile. Near a southern city I have seen narrow, oven-like compartments built in tiers, one over the other, enclosing altogether a hollow square, and have been told that when a coffin is pushed from the front into one of these compartments another drops out behind, carrying the relic of its former occupant to the accumulation of remains in the rear, where lizards creep and insects and crawfish serve their useful purposes in the economy of nature beneath a southern sun.

Of like fashion is the trend of science. All along the corridors of history we find the scientists of one generation pushing the remains of those who preceded them out of their alcoves, over the edge, into a cosmopolitan grave. It is a common destiny, and few participants take more than a minor part in this scientific parade. The errors of those who precede are dumped together and rest in the rubbish caves with the mistakes of those who went before. The spirit of truth only, as evolved by these men, moves onward. Errors once cherished as facts are of no more consequence to modern scientists than the cavern bearing its antique pile of skulls and thigh bones is to a native Mexican.

Never religious enthusiast was more dogmatic than has been the fanatic steeped in orthodox "science." Never was pagan more ruthless than is the "scientist" who raises his scimitar to cut down the standards of his ancestors. And yet these men of science are faithful, sincere, earnest, courageous and self-sacrificing, and are working to the betterment of mankind. Few of them ever reap any great personal reward in life. Few are conspicuous enough even to merit an individual mausoleum. They write their names on the surface of the reef within which empiricism has entombed itself, and soon their names are scratched off by their own followers. So the scientist and the empiricist go down together into oblivion, and within a moderate period of time only a few conspicuous names remain. The anticipations and disappointments of all others who preceded rest in the silence of the past. Among them will be found the hopes and delusions of both empirical and scientific pharmacists.

"On the graveposts of our fathers
Are no signs, no figures painted;
Who are in those graves we know not,
Only know they are our fathers."

JOHN URI LLOYD.

ORIGINAL ARTICLES

A STUDY OF THE RESINS OF PODOPHYLLUM PELTATUM L.

By I. S. Mellanoff,* B. Sc., and H. J. Schaeffer,* B. Sc.

IT HAS BEEN erroneously stated and the misstatement frequently repeated, that the resin of podophyllum was discovered in 1831 by William Hodgson, Jr., and that this discovery was verified by Lewis in 1847. They were the first to investigate the rhizome of podophyllum but the true history of their efforts may be briefly stated as follows:

Hodgson,[1] in 1831 made an assay of Podophyllum peltatum employing destructive chemistry, that is, used reagents which destroyed the true reaction. He obtained, thereby, largely decomposition products, but so far as any evidence was ever presented, he failed to isolate the energetic, resinous constituent of podophyllum, afterward to become so conspicuous.

In 1847, Mr. John R. Lewis[2] again investigated the rhizome of podophyllum, and again applied too much chemistry, and obtained as a result, a series of decomposition products, among which was one of a very slight cathartic action. If the resin were present in this substance it existed in a very small amount, the cathartic dose as reported by Mr. Lewis being eight (8) grains.

However the true resin of podophyllum was accidentally discovered in 1835, by Dr. John King, then a physician of the botanic school of medicine, and was then administered by him with nearly fatal effects. Dr. King described this resin, which may be designated as "the resinoid forerunner." It constituted the first American member of that list of substances.[3] The substance was introduced by Dr. King under the name, RESIN OF PODOPHYLLUM. He describes the process of its production as follows:[4]

> "I obtained only the resin by extracting all that alcohol will take up, then filter the alcoholic tincture to which I add an equal amount of water and separate the alcohol by distillation. The resin sinks in the water."

*A paper prepared from a joint thesis by the authors and presented to the Faculty of the Philadelphia College of Pharmacy and Science in partial fulfillment of the requirements for the degree of Master of Science, and representing work conducted in the Analytical Chemistry Laboratory of the College.

Without materially altering the product, Dr. King afterward modified his process by evaporating the alcoholic tincture to a cream, pouring the residue into cold water and collecting the precipitated resin.

The alcoholic extraction method of Dr. King is the basis of the present assay methods for podophyllum. The object of this study was to improve the method in determining the resin of podophyllum, the objection to the methods commonly used being that they required too much time for the maceration and percolation of the drug. Solvents were selected that possessed both solvent and penetrative properties and eliminating those which extracted objectionable matter. After a more suitable solvent was found, the investigations were directed along lines of separating and determining the component parts of the resin. Only two methods for the assay were studied.**

The first method used for the valuation of the resin of podophyllum was the one employed by W. M. Jenkins,[5] and is conducted as follows:

> "In assaying the drug 10 gm. of the powdered drug are placed in an Erlenmeyer flask and 25 cc. of alcohol are added. The flask is then fitted with a stopper through which is inserted a glass tube about two feet long for a condenser and left on a sand bath at 80 degrees C. for three hours.
>
> "The contents of the flask are then transferred to a small percolator and washed with alcohol until about 50 cc. of the percolate are obtained. When cooled to room temperature, the solution is made up to exactly 50 cc. Of this solution, 10 cc., representing two grams of the drug, are used for assay. Measure 10 cc. into a separatory funnel, add 5 cc. of alcohol, 10 cc. of chloroform and 10 cc. of acidulated water containing 0.6 per cent. HCl. Shake and allow the mixture to separate. Draw off the lower layer into another separatory funnel; repeat the extraction twice, using 15 cc. of a mixture of one part of alcohol and two parts of chloroform, each time, and add these extractions to the first. Shake the combined extractions with 10 cc. of the acidulated water and allow the mixture to separate. Draw off the lower layer into a tared flask and repeat the extraction twice using 5 cc. of the alcohol-chloroform mixture each time. Evaporate the combined extractions and dry the residue to constant weight at 100 degrees C."

**The podophyllum used for these studies was obtained from Valentine H. Smith Co., of Philadelphia, Pa.

Another method which is an adaptation from the method in the U. S. P. IX and which was tried, is as follows:[6]

> "Moisten 10 gm. of the powdered drug with 5 cc. of alcohol and pack it in a cylindrical percolator; then add enough alcohol to saturate the powder and leave a stratum above it. When the liquid begins to drop from the percolator, close the lower orifice, and, having closely covered the percolator, macerate the drug for forty-eight hours. Then allow the percolation to proceed gradually adding alcohol until the percolation ceases to produce more than a slight turbidity when dropped in water. Evaporate the alcohol in a tared beaker until the percolate is reduced to the consistency of a thin syrup, and pour this slowly, with constant stirring into a second tared beaker containing 10 cc. of water previously acidulated with 1 cc. of N. HCl† and cool to a temperature below 10 degrees C. When the precipitate has subsided, decant the supernatant liquid into the first beaker and stir well. Wash the precipitate in each beaker with fresh portions of 10 cc. of cold water. Dry the contents of the two beakers ‡ and weigh. If preferred, a tared Gooch crucible may be used for collecting the two precipitates."

Using the above modified U. S. P. IX method, other solvents and mixtures of these were used to ascertain which had the greatest penetrating and solvent power. From actual experiment a mixture of one part acetone and one part alcohol proved most satisfactory. The solvents in the order of their penetrative power are:

alcohol-acetone (1-1)
alcohol
acetone-chloroform
alcohol-chloroform
acetone

The following solvents have little or no solvent action on the drug:

carbon disulphide
ether
chloroform
benzene
ethylene dichloride

†The British Pharmacopœia (1855) abandoned the use of HCl as it is not necessary if the tincture is evaporated to the consistency of thick honey. HCl was directed in the 1898 revision as its seems to aid the precipitation when the tincture is not so concentrated.

‡Dry at a temperature not exceeding forty (40) degrees C.

By experiment it was found that the alcohol-acetone method of extraction is superior to the method when alcohol alone is used as the solvent, in that it completely exhausts the drug in less time, the time required for maceration being twelve hours. However, for more accurate determinations it is well to conduct a second maceration and percolation using the same menstruum. This precaution must also be employed when any other solvent is utilized. From results the identical percentage of extractable matter was obtained, whether alcohol or a mixture of alcohol-acetone was used, and it was found that the second maceration and percolation yields an additional 0.4 per cent. resin. The alcohol-acetone mixture, however, appears to be the ideal one for the extraction of the resin, the acetone having great penetrative power and the alcohol being a very suitable solvent.

To safeguard against errors, the drug was subjected to a third extraction using the same menstruum (alcohol-acetone) and then extracted with alcohol, acetone, etc. All the solvents failed to extract any measurable amount of substance after the drug was exhausted by the above mentioned process and the necessary precaution taken. Since the alcohol-acetone mixture yielded the same percentage of resin it is logical to believe that this combination does not extract anything else aside from that which is extracted by the alcohol.

It was found that solvents which gave consistently low results were extracting certain specific constituents, leaving behind the remaining parts of the drug.

A Comparison of the Results Obtained From Various Methods

JENKINS METHOD.

5.66% resin	5.45% resin	5.47% resin
5.52% "	5.76% "	5.51% "
5.56% "	5.61% "	5.50% "
5.48% "	5.38% "	5.55% "

METHOD ADAPTED FROM THE U. S. P. IX.

5.62% resin	5.62% resin	5.59% resin
5.70% "	5.66% "	5.64% "
5.66% "	5.50% "	5.47% "
5.36% "	5.48% "	5.40% "
5.57% "	5.60% "	5.53% "
5.51% "	5.54% "	5.44% "

METHOD ADAPTED FROM THE U. S. P. IX USING A MIXTURE OF ALCOHOL AND ACETONE (1-1).

5.33% resin	5.61% resin	5.49% resin
5.43% "	5.52% "	5.64% "
5.52% "	5.59% "	5.62% "
5.60% "	5.48% "	5.51% "

METHOD ADAPTED FROM THE U. S. P. IX USING ETHYL ACETATE.

3.68% resin	3.67% resin	3.59% resin
3.45% "	3.54% "	3.60% "
3.67% "	3.58% "	3.49% "
3.74% "		

METHOD ADAPTED FROM THE U. S. P. IX USING ETHYLENE DICHLORIDE.

1.72% resin	1.71% resin	1.81% resin
1.83% "	1.74% "	

The Extraction and Isolation of the Various Constituents of the Resin of Podophyllum [7]

The powdered podophyllum is percolated with petroleum ether until the percolate no longer gives a residue upon evaporation. The petroleum ether extract yields a *fatty substance* upon evaporation. The residual drug is then extracted with c. p. chloroform until the percolate is free of any coloring matter. The chloroform percolate is then concentrated to a syrupy consistency and slowly poured into a large volume of c. p. ether. *Podophyllinic acid* which is insoluble in the ether-chloroform solution will separate out in a floculent form and is filtered and dried. The podophyllinic acid is purified by dissolving in choloroform and precipitating by pouring into ether. The ether-chloroform solution is evaporated to a small volume and is poured into twenty times its volume of petroleum-ether. *Podophyllotoxin* is thrown out of solution while a *fatty matter* remains in solution. Podophyllotoxin can be purified by repeatedly dissolving and precipitating with petroleum ether. The fatty matter is obtained by the evaporation of the petroleum ether. The residual drug is now extracted with ether. The ether is evaporated and glacial acetic acid is added. Upon evaporation (slow) *Podophylloquercetin* will crystallize.

Outline of Above Method

Powdered drug;
macerate and extract with petroleum ether

Petroleum ether ext. yields a Fatty substance upon evaporation (a)	Residual drug; extract with chloroform			Residual drug;—extract with ether, add glacial acetic acid. Upon slow evaporation the coloring matter, *Podophylloquercetin*, crystallizes. (e)
	Chloroform extract;—concentrate to a syrupy constituency and pour into a large volume of ether.			
	Insoluble *Podophyllinic Acid* (b)	Evaporate filtrate to a small volume and pour into petroleum ether.		
		Insoluble *Podophyllotoxin* (c)	Evaporate filtrate to dryness *Fatty Matter* (d)	

	Melting Point	*Refractive Index*	*Specific Gravity*
Fatty substance (a)	24.5° C.	1.549° at 20.5° C.	.9517 at 21° C.
Podophyllinic acid (b)	159°-161° C. (I)	.....	.....
Podophyllotoxin (c)	135°-139° C. (II)	1.362° at 23.5° C. (III)	.....
Fatty matter (d)	20° C.	1.503° at 19° C.	.9939° at 19.5° C.

(I) soften at 159° completely melted at 161°.
(II) soften at 135° completely melted at 139°.
(III) one (1) gram in 100 cc. alcohol (95%).

	Saponification Number	*Unsaponifiable Matter*	*Acid Number*	*Iodine Number*
Fatty substance (a)	120.36	24.42%	67.3	75.4
Podophyllinic acid (b)	122.12	1.88%	33.6	53.5
Podophyllotoxin (c)	162.7	None	97.9	39.3
Fatty matter (d)	137.28	16.9%	74.1	58.4

Polarimetric Determinations of the Constituents of the Resin

Fatty substance (a)	shows birotation	
Podophyllinic acidd (b)	lævorotatory	104.04° at 25.5° C. (IV)
Podophyllotoxin (c)	lævorotatory	83.23° at 24°C. (V)
Fatty matter (d)	dextrorotatory	104.04° at 20° C. (VI)

(IV) dilution .5 gm. in 100 cc. alcohol (95%).
(V) dilution 1.0 gm. in 100 cc. alcohol (95%).
(VI) dilution 1.0 gm. in 100 cc. alcohol (95%).

Table of Solubilities

Podophyllinic Acid

Soluble in alcohol, ether, chloroform and acetone.
Soluble to the extent of 4.4 parts in 1000 parts of water.
Soluble to the extent of 31.4 part in 1000 parts of chloroform.
Soluble to the extent of 7.0 parts in 1000 parts of ether.
Soluble to the extent of 70.4 parts in 1000 parts of CCl_4.
Soluble to the extent of 2.0 parts in 1000 parts of benzol.
Soluble to the extent of 6.6 parts in 1000 parts of ethyl acetate.

Podophyllotoxin

Soluble in alcohol, ether, chloroform and acetone.
Insoluble in petroleum ether.
Soluble to the extent of 3.0 parts in 1000 parts of CCl_4.
Soluble to the extent of 10.6 parts in 1000 parts of benzol.
Soluble to the extent of 0.7 parts in 1000 parts of water.

Podophylloquercetin

Soluble in ether, acetone, ethyl acetate and alcohol.
Sparingly soluble in chloroform, carbon disulphide and carbon tetrachloride.
Insoluble in inorganic acids.
Very soluble in hot glycerol.

Conclusion

A method was obtained that reduced the time for determining the resin of podophyllum. By means of selective solvents, the resin was separated into its component parts and the physical and chemical properties of these constituents determined.

Acknowledgment

The authors are indebted to Dr. Henry Leffmann and Professor F. X. Moerk, of the Philadelphia College of Pharmacy and Science, for their many helpful suggestions.

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MILK AND BLOOD SERUM: AN HYPOTHESIS*

By David Wilbur Horn, Ph. D.

Introduction

BACTERIAL growth goes forward in milk differently from the way it progresses in artificial culture media. Again, bacterial growth goes forward in heated milk differently from the way it progresses in unheated milk. The differences are common knowledge and are beyond reasonable doubt.

Bacterial growth received unusual attention during the World War, and as a consequence scientific advance was made in several important matters in this connection. These acquisitions are now also common knowledge.

The weakness of analogy is recognized by the writer, but the part this form of argument has played in the early development of theories is also familiar to him.

The Incubation Period (Soxhlet)

This is the name of a period immediately after the milk is drawn from the cow, during which the bacterial count of the milk does not increase. If the freshly drawn milk contains enough bacteria, the plate count actually diminishes appreciably during this period.

A time honored explanation of this phenomenon is that bacteria in freshly drawn milk gather together into clusters. Such clustering is purely assumed, and is not known by experiment or paralleled by experience in related lines. Following this idea, since each cluster

*This paper was presented at the Third Annual Meeting of the Pennsylvania Association of Dairy and Milk Inspectors, Pittsburgh, December 31, 1926.

could produce only one colony and since each cluster contains more than one miscro-organism, there will be fewer colonies than bacteria and, as clustering progresses, there will be fewer and fewer colonies.

There is an implicit assumption of a relatively low rate for this clustering, namely, a rate lower than that of bacterial reproduction. Unless this implicit assumption is allowed, the theory if logically followed suggests that the incubation period might last an indefinitely long time, or might steadily bring the colony count nearer and nearer to a minimum count that would just equal the limiting number of clusters producible under the given conditions. Though logical, neither of these conclusions is in accord with the facts of observation; the incubation period is usually over in a few hours, and the bacterial count does not halt at a minimum.

We have therefore been for some time in a position to entertain any other hypothesis to account for the incubation period provided it did not involve more assumptions or less reasonable assumptions than those of the theory of clustering. In fact there are quite a few who already prefer to think of this phenomenon as due to a true germicidal power of the milk.

The hampering of incipient bacterial reproduction, and even the inhibiting of it has been observed in blood serum. This has been traced to a partial or complete neutralization of the digestive ferments of the micro-organisms, which digestive ferments unneutralized will convert the unassimilable native proteins of the blood into assimilable ones (and will produce other changes as well). (A. E. Wright.) This action of the blood is referred to as *anti-tryptic* and from the point of view of this *anti-tryptic power* of the blood serum, micro-organisms have been classified into three groups. The first of these groups, called serophytic, includes those micro-organisms that produce trypsin as they grow in blood serum, that grow much more rapidly in test tubes if trypsin be supplied to them, and, that proliferate in normal blood serum. All micro-organisms capable of producing septicæmias belong in this group; it includes the streptococcus and the staphylococcus. The second group includes micro-organisms that are incapable of proliferation in normal blood serum, that do not produce trypsin during growth, but that can grow in blood serum after trypsin has been added to it. The third group consists of micro-organisms directly poisoned by the blood serum.

Turning back from blood serum to milk, we recall that bacteria introduced from the outside into the milk of the udder either do not proliferate, or, are destroyed. We recall that the bacterial flora of the udder consists largely of cocci. Micro-organisms other than cocci in the freshly drawn milk may belong mainly to the second and third groups and hence be incapable of proliferation in normal milk or be directly poisoned by it. From this point of view, the incubation period of Soxhlet would be that time during which the third group were being destroyed, the second group inhibited, and the first group growing steadily under unfavorable conditions and changing steadily the normal freshly drawn milk to an abnormal fluid more fit for the growth of adventitious organisms of the other groups, and for their own more rapid growth.

By thus using the analogy of milk to blood serum, the theory of clustering becomes unnecessary.

The Period of Bacterial Growth

In blood, the chemical reaction of the normal serum has been demonstrated to be an additional defensive agency.

The chemical reaction of normal milk lies between pH 6.3 and pH 6.6. This hydrogen ion concentration persists in spite of the conversion of notable amounts of lactose into lactic acid, though finally it does change to values less than pH 6.0.

This chemical reaction of normal milk is such as to add to whatever self-protective qualities the milk may possess against micro-organisms of the first two groups, for trypsin acts best only in a slightly alkaline medium.

In the souring of milk the pH value has been found to remain practically unchanged (at pH 6.35) throughout the first 11 (eleven) hours or so, although the acidity determined by titration according to the method of Soxhlet and Henkel is at the same time steadily rising.

Further, the chemical reaction of normal milk is, and remains for many hours, such as to favor the growth of adventitious micro-organisms not dependent upon trypsin for their growth, for its hydrogen ion concentration lies well within the limits pH 6.2 to pH 7.0 that are considered best for bacterial growth in general.

With all these matters in mind, it would be reasonable to expect the streptococcus and the staphylococcus which are present in udder

milk not to thrive unrestrainedly, and to expect them to be outstripped by some adventitious organisms. It would also be reasonable to expect not a few but many different forms to thrive throughout the period during which the hydrogen ion concentration persists at or about pH 6.3 to pH 6.6. When this finally changes due to the conversion of the secondary and primary phosphoric acid, and when the lactic acid begins to attack the calcium salt of casein and convert it into the insoluble casein acid, then and thereafter it would be reasonable to expect only the acid-resistant forms to thrive.

These reasonable expectations coincide with what has been observed for many years. Conn (1908) described what actually occurs in milk after the incubation period (Soxhlet) as follows: "First Period of Growth . . . For a number of hours there is an increase of most species. Most of the kinds of bacteria in milk find it a favorable medium, and multiply with varying degrees of rapidity according to the nature of the species. But some multiply more rapidly than others, so that the proportion of the different types will constantly change as the hours pass. For a period of twelve hours at ordinary temperatures, there is a fairly regular increase of nearly all species, although the common lactic bacterium grows more rapidly than any other . . . Second Phase. After the number of bacteria have become fairly large,—it is found that the Bact. lactis acidi has gained the upper hand of the others. This species, present in small numbers at the outset, has increased in proportion until at the close of the first period there may be from 20 to 40 per cent. of them. During the second period, which now follows, they rapidly increase until they finally come to be nearly 100 per cent. This type of organism has, in other words, almost or completely replaced the numerous species found at the outset. This second phase ends with the souring and the curdling of the milk."

The Third Phase, as Conn called it, "does not affect the milk handler, but chiefly the cheese producer, for it is only in milk products that have been kept many days or several weeks that the later changes occur." This we shall not consider further.

To sum up in a few words it seems fair to say that in the consideration of an anti-tryptic power in milk along with the recently established facts of its hydrogen ion concentrations there is found enough to furnish a reasonable explanation of all that Conn gave in 1908 as "representing an average" in the bacterial history of milk from the incubation period (Soxhlet) until the milk curdles.

The Effect of Heating Milk Upon the Later Bacterial Growth

Burns upon the surface of the body increase the bactericidal power of the blood serum for some bacteria. Following upon this observation it has been demonstrated that if a portion of blood serum be heated to 60 degrees C. and cooled, then by adding more or less of this heat-treated serum to normal serum, the bactericidal power of the normal serum can be altered. "Here we have antigen in form of disintegration products. . . . Regarding such non-bacterial antigens it may be said they are not specific." (A. E. Wright 1926.)

Here is a remarkable fact that we propose to transfer by analogy to milk. Heating milk would, accordingly, be expected not only to kill certain micro-organisms but further to render the heat-treated milk more germicidal, at least toward some forms, than normal milk. The heating of milk commercially is carried on at temperatures comparable with the 60 degrees needed to produce non-specific antigen in blood serum, for it goes on at from 59 degrees to 64.5 degrees C. for from twenty to thirty minutes.

By this heating, the hydrogen ion concentration of milk is not significantly altered. Therefore unless non-specific antigens or other bactericidal substances are produced in heating, bacterial life in milk after heating would reasonably be expected to go on just as before heating. But actually after heating the bacterial history changes, fundamentally. Thus if the heat-treated milk be infected with lactic acid bacilli, it appears (Tillmans and Obermeier 1920) that it requires about twice as many hours before the hydrogen ion concentration has been changed to a value beyond the limit pH. 6.0. This analogy then offers an explanation of the different flora in pasteurized milk, as compared with normal milk, during the relatively extended period of benevolent hydrogen ion concentration; organisms that otherwise would grow rapidly may reasonably be thought of as retarded or inhibited by the heat disintegration products.

Closing Remarks

As stated at the beginning of this paper, the argument proceeds largely by analogy, *i. e.*, by an assumed analogy between milk and blood serum; and it has been laid down along general lines only.

I have quoted Conn's description because it is a classic by a man who knew the facts. I have used A. E. Wright's views upon

Immunity, freely; and have drawn with confidence from Tillman's & Obermeier's work upon the hydrogen ion concentration of milk. Bacterial classifications subsequent to Conn's are not in any way excluded; the matter of classification is an uncertain detail which is not vital to the hypothesis.

If it be allowable thus to use the analogy between milk and blood serum, then there are available consistent explanations of the outstanding facts of observation from the time milk is drawn from the cow until it is consumed or converted into milk products. The value of these suggestions will be measured by their ultimate usefulness, and their value seems to the writer to be enhanced by the utter lack of any other consistent explanations of the phenomena of bacterial growth in milk.

A PRACTICAL METHOD FOR TESTING THE GERMICIDAL POWER OF CERTAIN PRODUCTS*

By George F. Leonard, M. D., and Edna Heacock, A. B.

THE GERMICIDAL power of a given product depends on a number of factors. Among these may be mentioned the kind of organism present, age of culture, kind and reaction of medium, and the presence or absence of organic matter. In judging the value of a germicide these various factors must be taken into consideration, as a variation in any one of them may lead to considerable differences in the end result.

For most germicidal testing a non-spore bearing organism is used, as this class of bacteria are more uniformly killed than are the spore bearing organisms. As there are wide variations in the resistance of different strains of the same species, a strain should be selected that is not easily killed and the same strain used for comparative tests. The number of bacteria exposed to the germicide is important, and this can be largely controlled by using a uniform medium in kind and reaction, planting the same amount into seed tubes, and by observing closely the temperature and time of growth.

The temperature at which the culture is exposed to the germicide

*From the Biological Laboratories of E. R. Squibb & Sons, New Brunswick, N. J.

is also an important factor to be observed. A germicide will kill bacteria much more rapidly at a high than at a low temperature, so it is essential that the temperature be kept constant during the test. The addition of organic matter to a solution to be tested usually reduces the germicidal power of the product. Many bacteria which are killed with comparative ease in distilled water or physiological salt solution become much more resistant to a germicide when organic matter is present.

Many methods have been devised for laboratory use to determine the germicidal power of various agents. Zinsser [1] states that "the most precise method of standardizing disinfectants is that now in use in the United States Public Health Service. It is a modification of the Rideal-Walker procedure devised by Anderson and McClintic." [2] This method has been widely used since its publication, and has been accepted more or less as a standard in this country, and is usually referred to as the Hygienic Laboratory method. There has been a slight modification of the Hygienic Laboratory [3] method as originally given—the main difference being the elimination of the two-and-a-half-minute of exposure of culture to disinfectant, and a slight change in the calculation of the phenol coefficient. In the original method, the average of the highest dilutions that killed in two and a half and fifteen minutes was used in determining the phenol coefficient, while in the later modification they use the average of the highest dilutions that kill in five, ten and fifteen minutes.

Recently, Reddish [4] has published a method for the standardization of germicidal agents which has been used by the United States Department of Agriculture for determining the germicidal value of various agents. The method he describes is a modification of the Hygienic Laboratory method. The essential differences in this method from that of the Hygienic Laboratory method, are the use of a definite pH reaction of the culture media, and the use of .5 cc. of culture to 5 cc. of the germicidal dilution, whereas in the Hygienic Laboratory method .1 cc. culture is added to 5 cc. of germicidal dilution. He also recommends the use of a culture of staphylococcus aureus and calls the test a Staphylococcus Phenol Coefficient Test.

[1] Zinsser, *Textbook of Bacteriology*, 1927, p. 81.
[2] Anderson and McClintic, *Hygienic Laboratory Bulletin*, No. 82.
[3] *U. S. Public Health Reports*, 1921, July, p. 1559.
[4] Reddish, *Am. Jour. Pub. Health*, 1927, April, p. 320.

For the past eight years our Research Laboratories have developed various germicidal agents, and we have tested these products in our Bacteriological Laboratories. We have found the Hygienic Laboratory phenol coefficient test quite satisfactory in testing disinfectants from coal tar products. For the testing of colloidal silver preparations and others intended for local use on skin or mucous surfaces, it has seemed advisable to supplement the standard phenol coefficient test with one using a more resistant organism than B. Typhosus and one commonly found on the skin or mucous surfaces. A number of strains of staphylococcus aureus were tested against various germicidal agents and the most resistant strain was selected for use in our germicidal tests.

The test we have been using for the past eight years is a modification of the Hygienic Laboratory Phenol Coefficient Test. In place of the Bacillus Typhosus we have used the strain of staphylococcus aureus referred to above. We have used varying time periods, from one minute to two hours, in making the test in order to find the most suitable time of exposure of the culture to the germicide. As a result we have adopted as a routine procedure one, five, ten and fifteen minutes as being quite satisfactory. It is recognized that the one minute time is too short a period to give an accurate reading in determining a phenol coefficient, or to ascertain the strength of a product, but it is useful in giving an indication of the activity of the particular germicide in a short period of exposure. By use of the five, ten and fifteen minute periods, the phenol coefficient can be calculated according to the revised Hygienic Laboratory method, or one may use the ten minute period alone, as suggested by Reddish. In each of the tests, phenol has been used as a control as in the Hygienic Laboratory method.

In some tests we have recently used the .5 cc. culture added to 5 cc. of germicide, as recommended by Reddish. The extra amount of organic matter added in this test, by use of the .5 cc. culture instead of .1 cc., is an additional factor to take into consideration, and may influence the result of the test.

A brief description of the test we have been using follows, giving method of making culture medium and an outline of procedure, and an example of an average test for determination of the germicidal strength as compared to phenol.

The Test

The culture we have used in this test is a strain of staphylococcus aureus Squibb No. 73. It is maintained on nutrient agar slants, transferred monthly and held in icebox.

Three days before a test is made, a transfer is made from a stock tube to beef extract broth. Dairy transplants on bouillon are made for at least three days previous to the test. A twenty-four hour broth culture is used for the test.

Culture Medium

Beef Extract (Liebig's)	3 gms.
Peptone	10 "
Sodium chloride (C. P.)	5 "
Water, distilled	1000 cc.

Boil to dissolve.
Make up to original volume with distilled water.
Adjust reaction to 7.0 pH.
Filter through paper.
Tube 10 cc. to each tube.
Autoclave at 15 pounds for 30 minutes.

Phenol

A 5 per cent. stock phenol solution is made from pure phenol crystals, as given in the Hygienic Laboratory method. A fresh solution is made from this stock every time a test is made.

Apparatus

Clean glassware, and accurately standardized pipettes are used. Loops are made of standard size, 4 mm. in diameter.

Dilutions

Dilutions of phenol from 5 per cent. stock and from the germicide to be tested are made fresh the day of the test. All dilutions are made with sterile distilled water.

Addition of Culture to Dilutions of Germicide

One-tenth cubic centimeter of the bouillon culture is added to five cubic centimeters of each of the dilutions of the germicide, including the phenol dilutions. The amount of culture is added with a 1 cc. pipette graduated in one-hundredths. It is thoroughly mixed by gentle agitation.

A standard loopful of the mixture of culture and germicide is transplanted to the 10 cc. bouillon tubes at intervals of one, five, ten and fifteen minutes.

Temperature

The mixture of culture and solutions to be tested are held at 20° C. during the test.

Reading

The inoculated media tubes are incubated for forty-eight hours at 370 C., at the end of this time readings are made.

Determination of Coefficient

The phenol coefficient may be determined by the Hygienic Laboratory method or by the method suggested by Reddish. The phenol coefficient as determined by the Hygience Laboratory method is the arithmetic mean of the sum of three ratios, expressed decimally. The ratios are the denominator of the highest dilution of the germicide in whose subculture tube no growth occurs, divided by the corresponding figure for phenol, for the 5-, 10- and 15-minute intervals, respectively.

The method suggested by Reddish is to divide the highest dilution of the germicide that kills in 10 minutes by the highest dilution of phenol that kills in the corresponding time. The quotient is the phenol coefficient.

EXAMPLE

Sample	*Dilution*	*Time of exposure, in minutes*			
		1	*5*	*10*	*15*
Phenol	1-80	x	—	—	—
	1-90	x	x	—	—
	1-100	x	x	x	—
	1-110	x	x	x	x
Novargentum	1-300	—	—	—	—
	1-400	x	—	—	—
	1-500	x	x	—	—
	1-600	x	x	x	—
	1-700	x	x	x	x

Coefficient computed by Hygienic Laboratory method.

$$\frac{\frac{400}{80} + \frac{500}{90} + \frac{600}{100}}{3} = \frac{5.0 + 5.55 + 6.0}{3} = 5.51$$

or coefficient computed by Reddish method $\frac{500}{90} = 5.55$

We have found the test herein described to be a practical method for determining the germicidal power of various products. A brief description of the test is given in the hope that it may be of use in other laboratories where similar work is being done.

COLORIMETRIC DETECTION OF MORPHINE COMPOUNDS

By Frederick G. Germuth

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THE IODIC ACID test for the detection of morphine and salts of this alkaloid derivative of opium is generally conceded to rank among the best methods available for this purpose. This specific test, however, appears to possess one particular disadvantage in that the coloration produced by the addition of concentrated or diluted solutions of ammonium hydroxide to the carbon bisulfide quite frequently fails to materialize, or, in the event of its appearance, varies greatly in intensity or depth of shade.

The Method

The original iodic acid test is carried out in the following manner: The morphine or its derivative is converted into a soluble salt by the addition of dilute hydrochloric acid (about 2 N HCl), in slight excess. This is then evaporated to dryness. The residue obtained by this treatment is dissolved in a small portion of distilled water, to which has been added two drops of iodic acid solution, containing 7 grams of iodic acid (HIO_3) per 100 cubic centimeters of solution. Four drops of carbon disulfide are placed in this, and

the whole thoroughly agitated by energetic shaking. A medium-sized test-tube may be conveniently utilized at this point.

In the presence of morphine or its compounds, the carbon disulfide layer will be colored pink. Many other substances, however, also liberate free iodine from iodic acid, but, unlike morphine, do not retain this color, or fade perceptibly upon the addition of concentrated or diluted solutions of ammonium hydroxide. Upon adding this solution, the depth of color should be increased rather than diminished in concentration. Unfortunately, this observation is frequently the reverse of that anticipated. After substituting different bases, including the hydroxides of sodium, potassium, calcium and barium, and various mixtures of these for the ammonium hydroxide employed in the test, it was found that a solution containing 20 per cent. potassium hydroxide, 5 per cent. ammonium hydroxide (26 degrees Baumé) and 2 per cent. sodium carbonate produces a color that is more intense, of greater constancy and also one that is quite stable over a longer period of time than when ammonium hydroxide solution alone is used. The presence of narcotine ($C_{22}H_{23}O_7N$) in appreciable quantities fails to materially affect the sensitivity of the coloration produced.

It seemed evident, also, that higher temperatures within limits, would not appreciably affect the intensity of the coloration due to volatilization, as the alkaline solution employed is practically nonvolatile. This conclusion was borne out and substantiated by subsequent experimentation.

An effort was made to determine the applicability of the test described to a colorimetric procedure involving quantitative measurements. Experimental portions were prepared, containing from one-hundredth grain to one-half grain of morphine sulfate, in increments of one one-hundredth grain.

It was ascertained that the depth of shade produced was not directly proportional to the actual amount of morphine sulfate present in the experimental portions of the substance employed. This idea, therefore, was abandoned.

Mention should be made of the fact that the excess of hydrochloric acid required in the dissolution of the morphine sulfate in each case was determined by the use of methyl orange xylene cyanole indicator solution possessing a neutral point corresponding to a H^+ concentration of pH 3.8, although the employment of this particular indicator is not essential to the success of the method.

Summary

A modification of the so-called iodic acid test for the detection of morphine and its compounds has been presented, in which a solution consisting of 20 per cent. potassium hydroxide, 5 per cent. ammonium hydroxide (26 degrees Baumé) and 2 per cent. sodium carbonate is substituted for the ammonium hydroxide solution generally employed. Results are attended with a greater degree of certainty, and apparently are not affected by changes in temperature. The coloration produced does not fade or change in appearance over longer periods of time. Narcotine, a companion alkaloid, or its salts, is without effect on the method presented.

ABSTRACTED AND REPRINTED ARTICLES

A NEW METHOD OF STATING HYDROGEN-ION (HYDRION) CONCENTRATION

By Edgar T. Wherry [1]

THE TOTAL acidity or alkalinity of a solution, which may be determined by titration, is simply and conveniently expressed in terms of normality, or gram-equivalents per liter. For example, sulfuric acid, with the molecular weight of 98, is divalent, so that its equivalent weight is 98/2, or 49. A normal solution of this acid accordingly contains 49 grams per liter, a tenth normal solution 4.9 grams per liter, and so on.

When chemists discovered that in a given solution the amount of hydrion produced by the ionization of the acid is a matter of interest, attempts were made to state this also in normality terms. Hydrogen being a univalent atom with an atomic weight of practically 1, a normal solution of hydrion would contain 1 gram per liter. The amount of this ion present in the solutions ordinarily worked with being a very small fraction of a gram, abbreviated expressions, 5×10^{-6}, 8×10^{-3}, etc., were usually adopted. It requires, how-

[1] Former student and lecturer at the Wagner Free Institute of Science of Philadelphia; now Senior Chemist-in-Charge, Crop Chemistry Laboratory, Bureau of Chemistry, U. S. Department of Agriculture.

ever, an undue amount of mental calculation to appreciate the relative values of hydrion concentration (normality) represented by a series of such terms, and the plan has been abandoned.

In 1909 Sörenson pointed out that the logarithm of the reciprocal of the hydrion normality is directly related to the electrical potential due to the hydrion, and suggested a symbol somewhat inconvenient to set in type, and American biochemists have adopted pH. Because of its theoretical significance this method of stating hydrion concentration has come into general use by scientists.[2]

There are several objections to this system. The fact that the order of numbers is the reverse of that used in all ordinary methods of measurements is most serious. To have the greater acidity represented by the smaller number is enough to preclude its ever coming into general use by laymen, who numerically vastly preponderate over scientists. Scarcely less objectionable is the fact that the numbers are related logarithmically instead of arithmetically. It is true that laymen use logarithms (without knowing it) when they say that a given person's income runs into seven figures, the 7 being the characteristic of the logarithm of the amount concerned; but it is not to be expected that they will be able to use the mantissa of a logarithm similarly. Few persons indeed, whatever their training, can recognize offhand that orange juice, with an average pH value of 3.6, is 8 times as sour as grape juice, with pH 4.5, yet the fact that these numbers are negative logarithms makes that the relation between them.

A further objection to the pH system of statement is that scientists not infrequently overlook the logarithmic character of the numbers, and perform operations with them, such as arithmetic averaging, plotting against arithmetic quantities, etc., which may lead to erroneous results or conclusions. Two instances may be cited. In a recent study[3] of the reaction preference of spinach, this plant was grown in solutions with the pH values 4, 5, 7, 8 and 9, and the maximum yield was obtained at pH 5, which was assumed to be its optimum soil reaction. However, the curve obtained by plotting the data, using arithmetical quantities on both axes, has a maximum at about pH 6.7, which is close to the neutral point, and therefore accords with the practical experience that this crop is markedly responsive to neutralization of the soil by lime. The experimental

[2] Compare article by Trumper, *Amer. Jour Pharm.*, 1927, 99, 180.
[3] Agr. Expt. Sta. Mich. State Coll., *Techn. Bull.*, 1925, 71.

data were correct, but, as a result of overlooking the significance of pH values, an unwarranted inference was drawn. Again, as pointed out by Alexander,[4] in a recent elaborate work on the proteins, arithmetical data on swelling and other behaviors of gelatin were plotted against the logarithmic pH values, and the conclusion was drawn that this substance is a definite chemical compound which unites stoichiometrically with acids. A more judicious method of plotting would have shown this conclusion to be untenable. Moreover, it has become unsafe to judge the direction of changes in reaction from summaries or abstracts of papers, for some authors and abstractors say the hydrion concentration decreases when a solution becomes more acid, and others say that it increases.

My attention was directed in 1916 to the desirability of having a more readily understandable method of stating acidity and alkalinity when I undertook a study of the soil-reaction of a native plant, the Walking Fern (*Camptosorus rhizophyllus*).[5] Because of the considerations opposing the use of logarithms just discussed, I decided to adopt an arithmetical mode of statement. The anti-logarithms of the pH values were, however, obviously too unwieldy. I therefore took the additional step of making the pH value at neutrality a starting point, which gave relatively simple numbers for the liquids (soil extracts) under investigation. Moreover, when a soil was acid it was so described, and when alkaline this was so stated, whereas in the pH system only acidity is considered, even in the most alkaline of solutions. I later discovered that a similar plan had been proposed four years earlier,[6] but had never come into sufficiently general use to have been mentioned in the reference works I had consulted. Analogous procedures were also worked out independently by Henderson[7] and by Tillmans.[8]

During the succeeding ten years I have endeavored to improve upon the original plan, partly in response to various published criticisms and partly as a result of constructive suggestions by colleagues. The form which the method has now taken on is as shown in the annexed table.[9]

[4] Alexander, *Chem. Met. Eng.*, 1922, **27**, 369.
[5] *J. Wash. Acad. Sci.*, 1916, **6**, 72.
[6] Walker and Kay, *J. Soc. Chem. Ind.*, 1912, **31**, 1013.
[7] Henderson, *Science*, 1917, **46**, 73.
[8] Tillmans, *Zeitsch. Nahr. Genussm.*, 1919, **38**, 1.
[9] Quoted from *Amer. Hort. Soc. Bull.*, 1926, **4**, 3.

In the first column of the table are placed the pH values, which represent electrical potential due to hydrion. They are negative exponential numbers. Accordingly, the greater the acidity, the smaller the number, while each unit is ten times as large as the next below. In order to have some means for grasping the relative degrees of acidity actually indicated by these numbers, those given in the second column have been calculated. The method by which they have been obtained is as follows: The amount of hydrion present in a liter of pure water—which can be determined by physicochemical measurements even though its tendency to produce acidity is neutralized by the presence of an equivalent amount of hydroxylion—is taken as a unit of acidity; it amounts to 0.0000001 gram. By the use of a table of logarithms, the quantity of these units represented by each successive pH number is calculated. From the total amount of hydrion thus calculated is subtracted the amount of hydroxylion which is also present, the one being the reciprocal of the other, and the result is rounded off to the nearest 0.5. This yields the amount of hydrion present in the solution, free to exert the effects commonly classed as acidity; and it is accordingly termed *active acidity*. These active acidity numbers are then not "percentages" or "degrees" but rather "acidity units per liter." They are directly related numbers, and if one solution is found to possess an active acidity of 500 and another an active acidity of 20, the first can be readily seen to contain twenty-five times as much active acid as the second.

Comparison of Methods of Stating Reactions

pH	*Active acidity*	*Descriptive term*	pH	*Active alkalinity*	*Descriptive term*
3.0	10,000		7.0	0.0	Neutral
.1	8,000				
.2	6,300	(high)	.1	0.5	
.3	5,000		.2	1	
.4	4,000		.3	1.5	(l) (included
.5	3,150	Superacid	.4	2	in
.6	2,500		.5	3	Minimalkaline ..
.7	2,000	(low)	.6	4	circum-
.8	1,600		.7	5	(h) neutral)
.9	1,250		.8	6	
4.0	1,000		.9	8	

pH	*Active acidity*	*Descriptive term*	pH	*Active alkalinity*	*Descriptive term*
.1	800		8.0	10	
.2	630		.1	12.5	
.3	500	(high)	.2	16	(low)
.4	400		.3	20	
.5	315		.4	25	
.6	250	Mediacid	.5	31.5	Subalkaline ....
.7	200		.6	40	
.8	160	(low)	.7	50	(high)
.9	125		.8	63	
5.0	100		.9	80	
.1	80		9.0	100	
.2	63		.1	125	
.3	50	(high)	.2	160	(low)
.4	40		.3	200	
.5	31.5	Subacid	.4	250	Medialkaline ..
.6	25		.5	315	
.7	20		.6	400	
.8	16	(low)	.7	500	(high)
.9	12.5		.8	630	
6.0	10		.9	800	
.1	8		10.0	1,000	
.2	6		.1	1,250	
.3	5	(h) (included	.2	1,600	(low)
.4	4	in	.3	2,000	
.5	3	Minimacid	.4	2,500	Superalkaline..
.6	2	circum-	.5	3,150	
.7	1.5	(l) neutral)	.6	4,000	
.8	1.0		.7	5,000	(high)
.9	0.5		.8	6,300	
			.9	8,000	
7.0	0.0	Neutral	11.0	10,000	

On the alkaline side of the neutral point, represented by the right-hand half of the table, the procedure is similar, but there are certain modifications. On theoretical grounds, the pH numbers are customarily given, even on the alkaline side, although here the effect of hydroxylion overbalances that of hydrion. As the amount of one ion present is always the reciprocal of the other, however, no difficulty is introduced into the calculations. Admitting the theoretical desirability of having a continuous series, I nevertheless feel that as soon as the reaction of a solution has been shifted any distance to the alkaline side of the neutral point, it is the large excess of active alkali rather than the minor amount of acid still present which is biologically effective. Hence I prefer to use values for the *active*

alkalinity on this side. The unit here is 0.0000001 gram-equivalent of hydroxylion per liter; as before, the amount of the other ion present in each case is subtracted, and the result rounded off.

Two sets of numbers are thus made available—pH for those who can use logarithms in mental calculations, active acidity and alkalinity values for these who prefer arithmetic. There is a third class of users who are not interested in any numbers. For them, the final column in each half of the table has been provided. Here the active acidities and alkalinities are described by a series of terms with a roughly quantitative significace. In brief, when a solution has an active acidity expressible in thousands it may be termed *superacid;* in hundreds, *mediacid;* in tens, *subacid;* and in units, *minimacid.* On the alkaline side corresponding terms are used. In some cases it may be desirable to divide each of these classes into two parts, in which case the division may be made at the numbers, 30, 300, 3000, etc. A subacid solution in which the active acidity is less than 30 may be called low-subacid; one in which it is greater than 30, high-subacid, and so on. Finally, the following additional term is useful when dealing with solutions having reactions lying near the neutral point, where the changes from one tenth pH number to the next are so slight. Any reaction falling within the unit range on either side, where neither acid nor alkaline influences are markedly dominant, may be termed *circumneutral.*

In order to simplify the numbers as much as possible, the pH value of pure water at neutrality has been taken in the working out of my plan of reaction-statement, as exactly 7. It is realized, of course, that this depends on the temperature at which the observations are made; varying the temperature one degree may make a distinct change in the second decimal place. Certain writers, impressed by apparent numerical precision, have in recent times stated that the pH value at the neutral point is 7.07, but they base this on a determination which is not necessarily final and was made at some arbitrary temperature (presumably 15 degrees, although the importance of stating this is usually overlooked). Even if 7.07 is correct for 15 degrees, then 7.00 is the value at 18 degrees. If some future worker finds a different figure, however, I would urge that the temperature of reference be changed rather than the neutrality value.

Some critics point out that the pH system is almost universally used among scientists, and that there is, accordingly, no need for another. To this I would reply that as scientists come to realize

the need for making technical information more intelligible to the layman, new and improved methods of statement of data are sure to be developed. Others object to the division of the reaction-series into two parts at the neutral point. To this I have already replied,[10] pointing out that my plan is just as capable of being continued through the neutral point as is the pH system. There are, however, undoubtedly some cases where it is desirable to consider alkaline solutions to be alkaline, and then the neutral point forms the logical basis for the separation of these from acid solutions. As far as plant growth is concerned, it has recently been suggested by Olof Arrhenius [11] that hydroxylion may be as important as the hydrion, which has been almost exclusively considered heretofore. He, however, is not prepared to deviate from the pH method of statement, objecting to my plan in part as a result of taking more seriously than they were intended, some remarks of mine as to the ability of plants to recognize logarithms.

The disadvantages of this new method of stating reaction seem far outweighed by its advantages. The scientist can readily translate its terms into pH or any other sort of values when he so desires; the layman finds the reverse procedure difficult or in most cases impossible. The numbers, while slightly more complex than those of the pH system, do not often go beyond thousands in the ordinary solutions most likely to be met. This method recognizes the presence of both acidity and alkalinity, instead of emphasizing the one at the expense of the other. It is surely more desirable than a plan in which the relative magnitudes of acidity and the numbers expressing them run in reverse direction, and in which these numbers, being actually logarithmic, permit even prominent scientists to misinterpret experimental data by using them as if they were arithmetically related. In spite of the objections which have been raised against it, then, I still feel justified in urging the wider adoption of this new plan of statement of acidity and alkalinity.—(*Bull. Wagner Free Inst. of Sci.*, 1927 (2), 59.)

[10] *Ecology*, 1923, 3, 346.

[11] "Kalkfrage, Bodenreaktion und Pflanzenwachstum," Leipzig, 1926.

LABELING OF MEDICINAL PREPARATIONS*

FREQUENT inquiries are received at the New York office of the National Wholesale Druggists' Association relative to the labeling of medicinal preparations. In order to supply information on the subject in condensed form the following report is submitted.

1. The word "label" has been interpreted by the courts to cover any printed matter that accompanies the package, such as shipping container, wrapper, box, carton, bottle label, booklet or circular. It also includes such letters, circulars and pamphlets to which reference is made, either on the label attached to the package or on the package itself.

2. The label shall bear, plainly and conspicuously displayed, all the information specifically required by the food and drugs act, the quantity or proportion of the drugs named in paragraph (12) below, in accordance with the regulations set out in paragraphs (23) and (24) below. The label shall also bear such other descriptive matter as the character of the product may require.

3. The label shall be free from any statement, design or device regarding the article or the ingredients or substances contained therein, or quality thereof, or place of origin, which is false or misleading in any particular. The terms "design" and "device" include pictorial matter of every description, abbreviations, characters and signs.

4. In labeling, the manufacturer should avoid any suggestion, hint, or insinuation, direct or indirect, by statement, design, or device, that may tend to convey a misleading impression in any particular, and also any unwarranted representations that are indefinite or of a general sweeping character. It is the duty of the manufacturer to carefully consider whether the statements he proposes to put on his labels are strictly in harmony with facts.

5. In order to bear out the above statements we are quoting the paragraph from the pure food and drugs act which deals with this matter:

6. "A food or drug product shall not be labeled or branded in such a manner as to deceive or mislead the purchaser. Direct misstatements and indirect misrepresentations regarding the article or its ingredients by means of designs, printed testimonials, devices, or artifices in the arrangement, style or address of the package, or in

*Report No. 3 of the Committee on the Quality of Medicinal Products, of The National Wholesale Druggists' Association; Eli Lilly, Chairman.

the arrangement of the printed or pictorial matter in or upon the label or package are prohibited."

7. Any article containing more than one active medicinal agent is misbranded if named after a single constituent. The nomenclature employed by the United States Pharmacopœia and the National Formulary shall obtain.

8. The statement of the formula is not required on the label except in so far as may be necessary to prevent adulteration or misbranding.

9. An article so labeled as to convey the impression that all its ingredients are declared is misbranded if the list of ingredients is incomplete.

10. Care must be taken that on the labeling appears no misrepresentation, expressed or implied, as to the therapeutic effect of the product. In making statements of therapeutic efficacy on a label, a manufacturer assumes the position of one having a special knowledge of disease and its treatment, and the United States Supreme Court has ruled that he can be held accountable accordingly. Under the pure food and drugs act he is responsible for his statements or representations and no one can relieve him of this responsibility. Personal belief, testimonials in general, dispensatories, scattered isolated excerpts from medical publications, obsolete medical books, and discarded medical practices are not adequate authorities for therapeutic claims; the consensus of present-day medical opinion is the standard which shuld guide manufacturers in labeling. A preparation cannot properly bear promise of benefit unless as a matter of fact it can reasonably be depended upon to produce the results claimed for it.

Names of Diseases

11. A judicial decision states: "Language used in the label is to be given the meaning ordinarily conveyed by it to those to whom it was addressed." The printing of names of diseases or disorders on the labeling of a medicine for public sale conveys to the purchaser the impression that the product in itself is a competent treatment for the diseases mentioned. The names of diseases in labeling, therefore, should be limited to those for which the article, in view of the recognized medical action of its ingredients, considered singly or in combination, is a treatment. Names of organs or portions of the body should not appear upon a label unless the product can properly be considered a treatment for any and all disorders to which such organs or parts can be subject.

Misbranding

The term "misbranded" as used by the food and drugs act shall apply to all drugs or articles of food or articles which enter into the composition of food, a package or label of which shall bear any statement, design, or device regarding such article or the ingredients or substances contained therein which shall be false or misleading in any particular, and to any food or drug product which is falsely branded as to the state, territory, or country in which it is manufactured or produced.

12. For the purpose of this act, an article shall also be deemed to be misbranded, (1) if it be an imitation of or offered for sale under the name of another article, (2) if the contents of the package as originally put up shall have been removed in whole or in part, and other contents shall have been placed in such package, or if the package failed to bear a statement on the label of the quantity or proportion of any Alcohol, Morphine, Opium, Cocaine, Heroin, Alpha or Beta Eucaine, Chloroform, Cannabis Indica, Chloral Hydrate, or Acetanilid, or any derivative or preparation of any such substances contained therein, (3) if its package or label bear or contain any statement, design, or device regarding the curative or therapeutic effect of such article or any of the ingredients or substances contained therein which is false and fraudulent.

Standards for Drugs

13. A drug sold under or by a name, or a synonym, recognized in the United States Pharmacopœia or National Formulary, unless labeled as prescribed by paragraph (12) shall conform to the standard of strength, quality, or purity for the article as determined by the test laid down in the United States Pharmacopœia or National Formulary official at the time of investigation. An article shall not be deemed to conform to such standard of strength, quality, or purity unless it conforms in every respect to all the requirements and specifications of the United States Pharmacopœia or the National Formulary for the article.

14. A drug sold under or by a name, or a synonym, recognized in the United States Pharmacopœia or the National Formulary which does not conform to the standard of strength, quality or purity for the article as determined by the test laid down therein shall be labeled with a statement to the effect that the drug is not a United States

Pharmacopœia or National Formulary article; in addition it shall be labeled with a statement showing its own actual strength, quality, or purity, or else with a clear and exact statement of the nature and extent of the deviation from the standard of strength, quality, or purity set out for such article in the United States Pharmacopœia or National Formulary.

When a Label is Required

15. The use of a label is not compulsory except in the following cases:

(a) Imitations. An imitation shall bear on the label the word "imitation" and in addition a clear statement of the principal or essential ingredients of the article.
(b) Foods and drugs containing the ingredients mentioned in paragraph 12 above.
(c) Drugs which fall within the proviso of paragraph 16 below.
(d) Articles which require specific labeling to avoid adulteration or misbranding.

Adulteration

16. For the purpose of the pure food and drugs act an article is deemed adulterated if when a drug is sold under or by a name recognized in the United States Pharmacopœia or National Formullary, it differs from the standard of strength, quality, or purity as determined by the test laid down in the United States Pharmacopœia or National Formulary official at the time of investigation, provided that no drug defined in the United States Pharmacopœia or National Formulary shall be deemed to be adulterated under this provision if the standard of strength, quality, or purity be plainly stated upon the bottle, box or other container thereof, also the standard may differ from that determined by the test laid down in the United States Pharmacopœia or National Formulary.

17. If its strength or purity fall below the professed standard of purity or quality under which it is sold.

Adulteration Not Corrected by Labeling

18. Proper labeling alone will not remove any article from the operation of the law. Certain forms of adulteration, that is, the addition of a poisonous or deleterious ingredient which may render the

article injurious to health, cannot be corrected by any form of labeling.

Label Statement

19. The term "alcohol" without qualifications means ethyl alcohol. If any alcohol other than ethyl alcohol be present in the drug, the kind must be stated on the label.

20. In declaring the quantity or proportion of any of the substances specified in paragraph (12) above, the names by which they are designated in the act shall be used.

21. In declaring the quantity or proportion of derivations of any of the specified substances, in addition to the trade name of the derivative, the name of the specified substance shall also be stated so as to indicate clearly that the product is a derivative of the particular specified substance.

Declaration of Specially Denatured Alcohol

22. The Bureau of Internal Revenue has authorized the use of specially denatured alcohol in the manufacture of certain drugs. Some of the denaturants permitted are derivatives of alcohol. For the present the requirements of the Federal food and drugs act relating to the declaration of alcohol and its derivatives will be considered satisfied by either:

(a) Declaration of the percentages of alcohol and of each of its derivatives present as a denaturant in the finished product, or

(b) Declaration of the percentage of specially denatured alcohol in the finished product.

If (b) is chosen, the number of the formula of the denatured alcohol used should be stated. For example, if a product contains, 50 per cent. of specially denatured alcohol, Formula 23-B, the declaration should be "Contains 50% Specially Denatured Alcohol, Formula 23-B."

Method of Stating Quantity or Proportion

23. The quantity of alcohol in a drug shall be stated in terms of the average percentage by volume of absolute alcohol in the finished product.

24. In a liquid, the quantity of any substance specified except alcohol, and the quantity of any derivative or preparation of any

such substance, including derivatives of alcohol, shall be stated in terms of grains or minims per fluid ounce. In a solid, the quantity shall be stated in terms of grains or minims per avoirdupois ounce, provided that statements may be in terms of the metric system if preferred.

25. When two or more pills, wafers, powders, tablets, capsules, and the like are put up for sale or distribution in the same container, the quantity of the specified substance or derivative present in each pill, wafer, tablet, powder, capsule, or other unit, shall be stated.

26. The statement of the maximum quantity or proportion of any substance specified in paragraph present will meet the requirements, provided the maximum stated does not vary materially from the average quantity or proportion.

Character of Name

27. A simple or unmixed food or drug product shall be sold by its common name in the English language, or if a drug recognized by the United States Pharmacopœia or National Formulary, by the name or names therein designated.

28. A geographical name indicating that a drug product was manufactured or produced in a specific place shall not be used unless such product was manufactured or produced in that place.

Name and Address of Manufacturer

29. The name of the manufacturer or producer need not be given upon the label, but if given it must be the true name. The words "Packed for ————," "Distributed by ————," or some equivalent phrase shall be added to the label in case the name which appears upon the label is not that of the actual manufacturer or producer.

30. The place of manufacture or production need not be given upon the label except where, in order to avoid misbranding, it is necessary to indicate clearly that the article is of domestic and not foreign origin, and also in case of mixtures and compounds sold under their own distinctive name.

31. The place of manufacture or production, if given, must be correctly stated.

32. When a person, firm or corporation actually manufactures or produces a food or drug in two or more places, the actual place of

manufacture or production of each particular package need not be stated on the label except when the mention of any place to the exclusion of the others deceives or misleads.

Guaranty and Serial Number

33. On May 5, 1914, all guaranties on file with the Secretary of Agriculture were stricken from the files and all serial numbers cancelled. It is therefore no longer permissible to use either the serial number or guaranty legend on the label or package of food or drug products that come within the jurisdiction of the Federal food and drugs act.

34. In this connection we are quoting the regulation governing this matter: "Any wholesaler, manufacturer, jobber, or other parties residing in the United States may furnish to any dealer to whom he sells any article of food or drug, a guaranty that such article is not adulterated or misbranded within the meaning of the Federal food and drugs acts."

35. Each guaranty to afford protection shall be signed by and shall contain the name and address of the wholesaler, manufacturer, jobber, dealer, or other party residing in the United States making the sale of the article or articles covered by it to the dealer, and shall be to the effect that such article or articles are not adulterated or misbranded within the meaning of the Federal food and drugs act, specifically designating said act.

36. If a particular guaranty in respect to any article or articles be given, it should be incorporated in or attached to the bill of sale, invoice, bill of lading, or other schedule giving the name and quantity of the article or articles sold, and shall not appear on the label or package. A guaranty, if worded substantially according to the following form, will comply with all the requirements of the act:

> I (we) the undersigned, do hereby guarantee that the articles of food (or drugs) listed herein (or specifying the same) are not adulterated or misbranded within the meaning of the Federal food and drugs act.
>
> (Signature and address of guarantor.)

37. In lieu of a particular guaranty for each consignment, lot, or article of food or drugs, a general continuing guaranty may be furnished by the guarantor to actual or prospective purchasers. Such

general guaranty shall conform to the requirements of paragraph 35.

38. It having been determined that the legends "Guaranteed under the food and drugs act, June 30, 1906," and "Guaranteed by (name of guarantor), under the food and drugs act, June 30, 1906," borne on the labels or packages of foods and drugs, are each misleading and deceptive, in that the public is induced by such legends to believe that the articles to which they relate have been examined and approved by the Government and that the Government guarantees that they comply with the law, the use of either legend, or any similar legend, on labels or packages is prohibited.

39. A dealer in food or drug products will not be liable to prosecution if he can establish that the articles were sold to him under a guaranty given in compliance with this regulation.

Requests for Information on Products

40. The bureau is authorized to give out information concerning the quality and composition of preparations upon the market only in the form of notices of judgment published after court action. Requests for information concerning specific products can be complied with only in those instances where notices of judgment are available.

Requests for Analysis

41. The examination of samples of medicinal preparations is limited to those of an official character collected by authorized agents of the Department of Agriculture. Requests for analysis cannot be complied with since no authority or appropriation exists for such work.

Statement of Weight, Measure, or Count

42. The act does not require that the label of drugs shall bear a statement of the weight, measure, or numerical count of the contents of the package, but any statement of this nature should be correct and complete.

Toilet Preparations

43. The pure food and drugs act deals with foods and drugs, the term "drug" being defined in paragraph below. A toilet preparation that is not intended or represented, directly or indirectly, to be use-

ful for the cure, mitigation, or prevention of disease is not subject to the law, but the manufacturer should exercise care that it does not contain any ingredient that might be injurious to health.

Definition of Drug

44. The term "drug" as defined by the pure food and drugs act includes all medicines and preparations recognized in the United States Pharmacopœia or National Formulary for internal or external use, and any substance or mixture of substances intended to be used for the cure, mitigation, or prevention of disease of either man or other animals.

Testimonials

45. No statement relative to the therapeutic effect of a preparation should be made in the form of a testimonial for which the manufacturer is not willing to bear the full responsibility. Representations of curative or beneficial effect conveyed by testimonials are subject to the same requirements as other therapeutic claims. When a manufacturer publishes a testimonial to the effect that his medicine has produced certain results, he conveys to others the promise of a similar benefit, and he must assume the responsibility for all therapeutic claims made in this manner to the same extent that he does for promises of benefit made in his own words. That the testimonial may be bona fide and accurately quoted does not relieve him of this responsibility.

Collateral Advertising

46. Collateral advertising in newspapers and elsewhere and claims made by agents determine the meaning of any indefinite or obscure statements or representations in the labeling. The wording of collateral advertising should in no instance exceed, in the impressions produced, the terms of the labeling. No interpretation of, or reference to, the terms of the label should be used to create an impression in the mind of the purchaser that the preparation is a remedy, treatment, or preventive for diseases for which, in fact, it is not.

Approval of Labeling

47. Under the law there is no authority to approve or suggest labelings, formulas, trade names or advertising literature. Numer-

ous requests are referred to this department for the approval of labels. The act does not authorize the department to give such approval, and any printed matter upon the label implying that this department has approved it will be without warrant.

Important Quotation from Opinion of U. S. Supreme Court on Food and Drugs Act

48. "THE STATUTE IS PLAIN AND DIRECT. ITS COMPREHENSIVE TERMS CONDEMN EVERY STATEMENT, DESIGN, AND DEVICE WHICH MAY MISLEAD OR DECEIVE. DECEPTION MAY RESULT FROM THE USE OF STATEMENTS NOT TECHNICALLY FALSE OR WHICH MAY BE LITERALLY TRUE. THE AIM OF THE STATUTE IS TO PREVENT THAT RESULTING FROM INDIRECTION AND AMBIGUITY AS WELL AS FROM STATEMENTS WHICH ARE FALSE. IT IS NOT DIFFICULT TO CHOOSE STATEMENTS, DESIGNS AND DEVICES WHICH WILL NOT DECEIVE. THOSE WHICH ARE AMBIGUOUS AND LIABLE TO MISLEAD SHOULD BE READ FAVORABLY TO THE ACCOMPLISHMENT OF THE PURPOSE OF THE ACT." (From Opinion of the Supreme Court of the United States in United States vs. Barrels, *et al.*, No. 559, October Term, 1923.)

CORRESPONDENCE

Baltimore, Md., May 31, 1927.

DEAR SIR:

The Seventy-fifth Annual Meeting of the American Pharmaceutical Association will be held at the Hotel Coronado in St. Louis, Mo., during the week of August 22, 1927.

This is the Diamond Anniversary Meeting and the officers of the Association are planning for the biggest and best convention we have ever had.

Likewise, your officers of the Scientific Section are laying plans for bigger, better, more instructive and more interesting sessions than we have ever had before.

In order to do this, however, it is necessary that we have your co-operation and assistance. We are depending upon you for at least one paper upon any subject coming within the scope of your section.

To be assured a prominent place on the program send the Secretary the title of your paper as soon as possible.

There is no limit as to the length of papers presented but in order that all may have an Equal Opportunity to read their papers, your attention is called to the fact that the "By-Laws" of the section limit the time allowed for the presentation of each paper, to ten minutes, with an additional *five minutes* for discussion.

These rules will be strictly adhered to. Therefore, if your paper is too lengthy to be read in the time allotted, kindly be prepared to present it in abstract.

Owing to the large number of papers to be presented within a limited time, it will be impossible to include illustrated talks in the program.

This ruling, however, does not preclude the use of lantern slides to Illustrate a Scientific Paper, so long as the paper can be presented within the allotted time.

All titles of papers, and an abstract (not over 250 words) of the same must be in the hands of the Secretary by July 1st.

Papers received after July 1st cannot be assured of a place on the program and presentation can only be permitted as time may allow.

The program must be completed by this date in order to have it included in THE JOURNAL the month before the meeting.

The value of our meeting depends as much, and sometimes more, upon the character of the discussions as upon the papers themselves.

We are therefore again asking each author to help us enhance the value of the discussion by submitting to the secretary an abstract of 250 words or less of each paper to be presented.

The secretary will mimeograph these abstracts and distribute them to the section members in order that they can determine the papers in which they are most interested and come to the section meetings prepared to intelligently discuss them.

Trusting that you will co-operate with us in making the sessions of scientific section A Big Success by contributing at least one paper this year and that we may receive the Title and Abstract of the same before July 1st, we remain

Very truly yours,

JOHN C. KRANTZ, JR.,
Chairman.

PAUL S. PITTENGER,
Secretary.

MEDICAL AND PHARMACEUTICAL NOTES

ALCOHOL FOR CHEMICAL BURNS—Word comes from Germany that pure, highly-concentrated alcohol is extremely efficient in the treatment of burns from chemicals. Felix Fritz in a recent issue of *Farbenzeitung* recommends that highly concentrated, preferably absolute, chemically-pure alcohol be kept on hand in chemical plants, in amounts of several liters, especially for the purpose. For example, if the hand is burned, it is plunged into a suitable amount of alcohol in a clean porcelain dish, or a piece of bandage, dripping wet with alcohol, is applied to the affected part. The quicker the case is treated, the more effective is the remedy. Blisters never develop. Even in the case of sulfuric acid burns or those from hydrofluoric acid, the alcohol treatment is said to have proved effective. On the other hand, the inflammability of alcohol must be given consideration as an objection and recourse may be had to other remedies, as for example, strong silver nitrate or perhaps zinc chloride.—*Scientific American,* June, 1927; p. 421.

CARDAISSIN—A new compound has been extracted by Cameron from the suprarenal glands of cattle to which he gives the name cardaissin. It has been found to increase the heart rate. It does not affect any other organ than the heart, with the possible exception of the suprarenal glands. It accelerates the rate of the isolated heart of a guinea pig as much as 120 beats for forty-five minutes. When injected subcutaneously, it increases the heart rate of various normal mammals for long periods of time.—*J. A. M. A.* (88): 1762 (May 28), 1927.

BROMINE IN BODY FLUIDS—The simple specific color test here described for bromine in body fluids is specific, is not interfered with by the presence of iodine, and is more delicate in the presence of chlorine.

In cases in which bromide intoxication is suspected, it is a simple diagnostic measure to differentiate between this and other forms of intoxication.

The test is carried out as follows: Small strips of filter paper are soaked in a saturated solution of fluorescein in 60 per cent. acetic acid. These are then allowed to dry and may be kept indefinitely as indicators of the test. The suspected body fluid is placed in a test tube. To this are added a few crystals of potassium permanganate. After agitation, a few drops of concentrated sulphuric acid are added and fluorescein paper is held, after moistening with 2 per cent. acetic acid, at the mouth of the test tube.

The presence of even minute amounts of bromine is at once indicated by a rapid change in color from the original yellow to a bright pink on the paper.

The presence of chlorine and iodine in no way interferes with the detection of bromine in this test. A modification of the test has been tried and found successful, but not more delicate. It consists in blowing the released bromine gas into a second tube containing a solution of fluorescein. As the entire bromine present is in this way caught up in the fluorescein solution, it has a suggestive importance as a possible quantitative test.

The rapidity with which the test can be elicited is indicated by the fact that it was found positive in urine voided fifteen minutes after the oral administration of 10 grains (0.65 gm.) of sodium bromide. Bromide added to the urine directly can be determined as bromine in dilutions of 1 : 40,000; in distilled water, in 1 : 80,000; in 5 per cent. sodium chloride solution in 1 : 100,000, and in 20 per cent. sodium chloride solution in 1 : 200,000 dilutions.—*Belote, J. A. M. A.*, 88; 1696 (May 28) 1927).

A New Use for Thyroid Extract—The much discussed thyroid gland has a new use. Drs. William J. Kerr, George N. Hosford and H. C. Shepherdson of the University of California, have found that several of their cases of cataracts in elderly people have improved vision after the administration of thyroid extract.

Senile cataracts are thought to occur in individuals in whom a general breakdown of the body forces is under way and consequently any agent, such as thyroid substance, that tones up the whole system, is likely to be helpful in improving the impaired vision. The doctors are careful to state that cataracts may remain stationary for

years and even clear up upon occasion without treatment, thereby making it difficult to prove the actual value of any curative procedure that may be undertaken. They have, however, obtained such good results from this method that it may develop into a new weapon of attack against this insidious form of blindness.

The general condition of the patient should be carefully studied, says Dr. Kerr, and it is well for the practitioner or internist to co-operate with the ophthalmologist while the extract is being given. "There is no great danger in the administration of thyroid substance, if the patients are carefully studied before treatment and watched for toxic symptoms," he declares.

"When the metabolism of cholesterol is better understood we may find a relationship between it and formation of cataract in the senile as well as the diabetic patient," he went on. "Further studies are needed on the metabolism of sodium, potassium, magnesium and calcium in relation to the changes in the lens in senile cataract."

NICOTINE AND CAFFEINE INDICTED AGAIN—Pharmacologists and physiologists continue the debate: "Resolved that tea, coffee and tobacco exert an unfavorable action on life processes." One of the latest speakers for the affirmative, with data from his laboratory to support him, is Dr. Charles E. Chase of the University of Oklahoma, who has been endeavoring to determine the influence of nicotine and caffeine on young chicks.

"Large doses of nicotine were introduced daily into the crops of growing chicks," he stated. "Records of weights were taken to determine whether the growth curve was affected in comparison to that of controls, which received an equal amount of water similarly administered. The results indicate that nicotine is large doses first stimulated growth and later retarded it."

Dr. Chase repeated the experiments with caffeine, the drug in tea and coffee. "Caffeine retarded growth throughout the course of the experiments," he declared. The physiologist is non-committal as to whether one may draw parallel inferences as to the effect of the alkaloids on man from the results of his experiments with chicks. —*Science Service.*

ANIMAL TISSUE FIGHTS DISEASE AFTER DEATH—Immunity to disturbing disease, invasions from the outside does not need to end with the death of the animal that possesses it, but will live on in a part of its tissues if these can be kept alive by artificial means. Dr. William Bloom of this city, describes in "Archives of Pathology," an ingenious experiment in which he showed that bits of a rabbit's lung, kept growing in a glass vessel after the rabbit's death, were still able to kill off disturbing elements against which the rabbit had been rendered immune during its lifetime.

In his research, Dr. Bloom substituted alien red blood cells, taken from a pigeon, for disease germs. He was able to do this because the blood of any animal will react toward many outside substances, especially proteins, very much as though they were hostile germs. He made the rabbit immune to the injection of these blood corpuscles by suitable physiological treatment. Further injections of pigeon blood corpuscles had no effect on the rabbit; they were simply destroyed by the white cells in its blood. Then the rabbit was killed, and a bit of its lung kept going as a tissue culture. Pigeon's blood was placed upon it, and the conduct of the white blood cells in the culture watched through the microscope. These minute "policemen of the blood" acted as though they were still in the living animal, seizing upon the alien corpuscles and devouring them.

As a further test, a tissue culture was made from the lung of another rabbit which had not be immunized. When pigeon's blood was added, its white cells did nothing. But when a little blood serum from the immunized rabbit was added, there seemed to be something in it that stimulated the white cells to action, for they then eagerly went after the pigeon corpuscles and soon destroyed them.—*Science Service.*

STATISTICS SHOW LESS ALCOHOLISM SINCE 1917—Whether we like it or not, prohibition seems to agree with us.

In a statistical study of conditions since the passage of the Eighteenth Amendment, presented at the American Medical Association here recently, Dr. Leonard G. Rowntree, of the Mayo Clinic, Rochester, Minn., stated that alcoholism has made a striking decrease since 1917. Cirrhosis of the liver, a degenerative disease, one form of which is due to alcoholism, is also decreasing in about the same pro-

portion, the Minnesota doctor's figures showed. The contention that urban population is notoriously wet, and rural sections notably dry, is borne out by the fact that both these conditions are found to occur most frequently in cities and are about half as prevalent in the country as in the city.

Deaths from too much booze in New York in 1920 were only one-seventh of those in 1916 and deaths from cirrhosis fell off more than half. In the dry and rural State of Kansas the death rate for both conditions has remained about the same as before the war. It is interesting to note, said Dr. Rowntree, that the highest mortality rate for alcoholism and cirrhosis recorded in Kansas in the last fourteen years represents the low water mark for deaths from the same cause during the same period in New York.

MYRTILLIN—A NEW REMEDY FOR DIABETES—Clinical tests of a new drug, myrtillin, expected to be of considerable supplementary value in the treatment of diabetes, were announced to the American Medical Association here this morning, by Dr. Frederick M. Allen, director of the Physiatric Institute at Morristown, N. J.

Dr. Allen stated that while myrtillin was in no sense a substitute for insulin, it does produce some of the beneficial effects of the better known drug without some of its greatest disadvantages. It can be taken by mouth instead of by injection and is entirely harmless, never producing an unduly low sugar content in the blood, but it has the disadvantage of not having the prompt and powerful action of insulin and is not successful in all cases.

"In a series of 81 patients observed," Dr. Allen explained, "the results in 21 were uncertain because of accidental interfering conditions, and 24 others were regarded as failures. In 36 cases benefits were obtained in the form of increase of diet or reduction of insulin, or both. Six of this group were particularly successful because it was possible to stop the use of insulin altogether. The action of myrtillin is gradual, one to several weeks usually being required before a change is evident. A higher degree of success is hoped for as the manufacture of myrtillin is improved, but myrtillin should never be regarded as infallible or as a cure for diabetes."

This new preparation was discovered by Dr. Richard R. Wagner, chief of the chemical department of the Physiatric Institute, who has also worked out the methods of producing it.

The leaves of the blueberry or huckleberry are the source of myrtillin, but it can be obtained from the green leaves of certain varieties of plants, especially the myrtle family, from which the name of the substance is taken.

"Myrtillin may be a vitamin," Dr. Allen declared in stating that it is at present a substance of unknown nature, which is believed to be an active constituent in animal as well as vegetable tissues, but is difficult to separate from protein, gums and other colloids.

A source of danger in the use of insulin in treating diabetes is that the patient will have the excess sugar in his blood, the condition characteristic of diabetes, removed too effectively, causing coma and perhaps death. Myrtillin has been found to effectively reduce the condition of excess sugar without removing the normal amount that healthy blood must have, which is about one to 10,000. Moreover, myrtillin has no toxic effects even in large dosage.

When it is necessary to perform a surgical operation on a diabetic patient, the sugar in the blood must be reduced. The present procedure is to reduce the blood sugar by carefully regulated injections of insulin and rigid control of the diet. This requires time and there is always danger of reducing the blood sugar too much. By use of Myrtillin, an overdose of which is not harmful, the blood sugar of a patient needing a prompt operation can be reduced to normalcy quickly.—*Science Service.*

Relation of Radon and Iodine Content of Drinking Waters to Incidence of Goitre—Volume 57, of the Transactions and Proceedings of the New Zealand Institute, recently published, contains a paper by M. N. Rogers, M. Sc., reporting the determination of the radon and iodine content of certain water-supplies in the neighborhood of Christchurch, New Zealand. This district is located on the southern island, which is the cooler area and is somewhat mountainous. It appears that a number of natural waters show marked radio-activity, and that there is also a notable development of goitre in that part of the island. The following figures show that the radon content has no relation to the incidence of the disease:

Location of Water Supply	*Radon*	*Goitre*
Waltham	229	59
West Christchurch School	150	75
Boys' High School	210	75
Girls' High School	160	75
Sydenham	280	70
Heathcote	38	14
Woolston	84	52
Timaru	0	70

The relative amount of iodine to the goitre incidence is:

Location	*Iodine (factors* $\times 10^{-9}$)	*Goitre*
New Brighton	2.9	47
Heathcote	4.3	14
Garanty	2.0	25
W. Christchurch	0.6	75
E. Christchurch	1.2	69
St. Albans	less than 0.2	59
Woolston	1.0	52
Blackball	1.4	81
Westport	1.0	46
Christchurch (tap-water)	0.2	63
Lyttelton	3.8	40

The Blackball supply is marked "river water; much organic matter."

The Westport supply is also marked "river water."

The inference from the figures is that if the iodine content is above 2×10^{-9}, the goitre incidence is reduced, but the other conditions will have to be considered before positive conclusions can be drawn.

—*H. L.*

SCIENTIFIC AND TECHNICAL ABSTRACTS

DETERMINATION OF SMALL QUANTITIES OF WATER IN MINERAL OILS, W. Boller (*Das Gas-Und Wasserfach,* April 9, 1927, p. 351)—When the quantity of water is small, as in the case of insulating oils, the otherwise satisfactory Marcuson method fails to give accurate results. The author has therefore developed a method for measuring the moisture content of transformer oils, which allows the exact determination of proportions less than 0.01 per cent. Through the weighed oil sample a stream of dry inert gas is passed, and goes thence carrying vapors of oil and water through a tube filled with calcium carbide. The moisture generates acetylene, the acetylene is caused to combine with copper, and from the weight of the insoluble copper compound the original moisture content is calculated.

DISTINGUISHING SEASONED FROM GREEN LUMBER, R. Lyon, G. Fron & M. Fournier (*Le Genie Civil,* April 2, 1927, p. 346)—The authors obtained the best results by the "ionimetric" method, applied to a solution produced by maceration of the wood under certain stated conditions. They conclude: (1) that lumber seasoned in the yard in the usual manner has a different chemical constitution from green lumber of the same kind, even when the latter has been artificially dried; (2) the change of chemical constitution of the lumber can be made evident either by microscopic observation, or by measuring the hydrogenion concentration of the part soluble in water. By the latter method it is possible to distinguish rapidly between seasoned lumber and green lumber of the same kind.

USEFULNESS OF VACUA (*Jnl. A. I. E. E.,* April, 1927, p. 360)—Strive as they may, scientists have been unable to attain a vacuum wherein a cubic inch includes fewer molecules than there are people in the world. Even so they have succeeded in removing 999,999,999,-999 per cent. of the gas. In other words, only one of every 10,000,-000,000 molecules remains; yet there are 40,000,000,000 molecules in

every cubic inch; the population of the earth is estimated at less than 2,000,000,000.

The swiftness with which the air is drawn out is equally marvelous. If, from a vessel holding a quart, there were removed a million molecules a second, it would take 750,000,000 years to remove practically all of its air; but the Langmuir pump accomplishes this in just two seconds.

The workman who keeps his drink hot or cold in a thermos bottle is indebted to Sir James Dewar's application of the vacuum, but the scientist is still more indebted to it. Our steampower plants, including turbines, also owe their success to vacua.

(Quotation from *The New Astronomy.* By Samuel Pierpont Langley. Prof. Langley was the father of aeronautics, pioneer of solar study and for many years secretary of the Smithsonian Institution.)

I have read somewhere a story about a race of ephemeral insects who live but an hour. To those who are born in the early morning the sunrise is the time of youth. They die of old age while its beams are yet gathering force, and only their descendants live on to midday; while it is another race which sees the sun decline, from that which saw it rise. Imagine the sun about to set, and the whole nation of mites gathered under the shadow of some mushroom (to them ancient as the sun itself) to hear what their wisest philosopher has to say of the gloomy prospect. If I remember aright, he first told them that, incredible as it might seem, there was not only a time in the world's youth when the mushroom itself was young, but that the sun in those early ages was in the eastern, not in the western, sky. Since then, he explained, the eyes of scientific ephemera had followed it, and established by induction from vast experience the great "Law of Nature," that it moved only westward; and he showed that since it was now nearing the western horizon, science herself pointed to the conclusion that it was about to disappear forever, together with the great race of ephemera for whom it was created.

What his hearers thought of this discourse I do not remember, but I have heard that the sun rose again the next morning.

NEWS ITEMS AND PERSONAL NOTES

PROMINENT BRITISH PHARMACIST VISITS AMERICAN CENTRES —Mr. Philip F. Rowsell, one of the most prominent figures in British pharmacy, is a member of the delegation from the British Chamber of Commerce to the Virginia State Chamber, which left England early in May.

Mr. Rowsell, with the delegation, will visit New York, Washington (where a visit will be made to the President), Norfolk, Williamsburg, Jamestown Island, Richmond, Lexington, Charleston, North Carolina, Louisville, Cincinnati, and Columbus (Ohio), Indianapolis, St. Louis, Chicago and Detroit. The delegation has been arranged to promote closer British-American friendship, the stimulation of British-American trade, and an extended use of the Virginia ports.

Mr. Rowsell is keenly interested in conditions affecting pharmacy in the United States, and hopes that, during the course of his tour, he will have the opportunity of meeting American pharmacists in the different centres, and exchanging experiences and views with them.

SOCIETY FOR HISTORY OF PHARMACY—As reported in the AMERICAN JOURNAL OF PHARMACY, December, 1926, pages 680 to 682, there was founded in Innsbruck, Tyrol, on August 17th and 18th, 1926, a Society for History of Pharmacy. Prof. Otto Raubenheimer of Brooklyn, N. Y., was in Europe at the time and became one of the charter members. Since then the Society has spread all over Europe and also has a membership of 160 in the United States, not a bad showing for our commercialized country.

The first annual meeting of The Gesellschaft fuer Geschichte der Pharmazie was held in the historic city of Nuremberg on May 7th and 8th, and was very well attended by representatives of different countries. The meeting was a great success and put the Society on a solid basis. Letters and telegrams were received from many members who were unable to attend as, for instance Prof. A. Tschirch of Bern, an honorary member of the Society; Prof. H. Thoms, Director of the Pharmaceutical Institute at the University of Berlin, and others.

The following were elected as corresponding members: Dr. Carl Bedall in Munich; Dr. Hans Heger and Director H. Lafite, Sr., in Vienna; Prof. Orient in Klausenburg; Editor Ernst Urban, in Berlin, and Prof. Otto Raubenheimer in Brooklyn, N. Y. The latter together with Prof. Leo Suppan of St. Louis, were appointed Referees for the United States.

The election of officers resulted as follows:

President: Dr. Ludwig Winkler, Innsbruck, Tyrol.
Secretary: Apotheker H. Gelder, Berlin.
Treasurer: Apotheker Georg Urdang, Berlin.
Editor: Apotheker Fritz Ferchl, Mittenwald, Bavaria.
Historian: Apotheker Walther Zimmerman, Illenau, Baden.

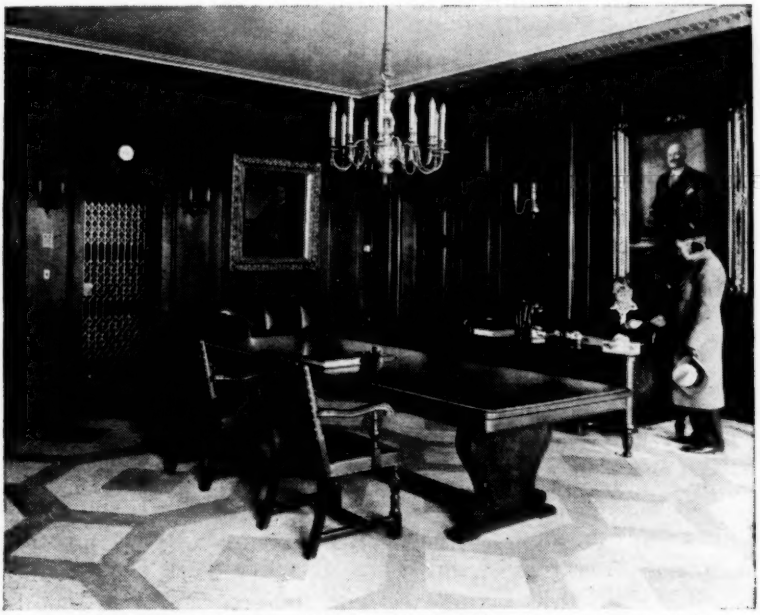
The officers, corresponding members and referees are pharmacists known internationally for their interest and work in pharmaceutical history. The same holds true of Prof. A. Tschirch in Bern, who was elected an honorary member in commemoration of his seventieth birthday on October 17th, 1926.

All those interested in History of Pharmacy and wish to join the new Society should address Prof. Leo Suppan, 432 Pestalozzi Street, St. Louis, Mo., or Prof. Otto Raubenheimer, 1341 Fulton Street, Brooklyn, N. Y.

Borocaine, A New Local Anesthetic—Borocaine, a non-irritating, non-habit-forming and practically non-toxic local anesthetic, recently brought to the attention of the medical and dental professions of Great Britain and continental Europe by A. J. Copeland, M. A., M. B., B. Sc., D. P. H., and H. E. F. Notten, B. Sc., A. R. C. S., University of Cambridge, England, is now commercially available. It is manufactured by Sharp & Dohme, Baltimore, and supplied in soluble tablets of 0.02 gm. and 0.10 gm. each, with or without epinephrine, and in one, five and twenty-gram bottles.

Frank G. Ryan's Memory Honored—Parke, Davis & Company are now occupying their new Administration Building. One of the features of it is a large reception room, on the east wall of which, directly in the line of vision of every visitor who approaches the

information desk, hangs a splendid oil painting of their late president, Frank G. Ryan. The painting is the work of Roy Gamble, a Detroit portrait artist with a national reputation. Mr. Ryan will be remembered by the older alumni of the Philadelphia College of Pharmacy and Science because of his former teaching connection with the institution. A fine testimony to his loyalty to his Alma Mater is the splendid scholarship fund established in the college according to a provision in his will.



Reception Room in the New Administration Building of Parke, Davis & Co.

PLANT SCIENCE SEMINAR 1927—The fifth annual session of Plant Science Seminar will be held at University of Illinois School of Pharmacy, 701 South Wood Street, Chicago, Ill., during the week, commencing August 15th or August 29th, 1927, definite date will be announced later.

Tentative Programme: Special addresses by Dr. H. Thoms, Pharm. Instit., Berlin, Germany; Prof. E. Fullerton Cook, Philadelphia College of Pharmacy; Dean W. B. Day, Chicago, Ill., School of Pharmacy.

Laboratory demonstrations: Quantitative evaluation of org. powders, Dr. G. L. Keenan; survey of our native drug resources, Dr. W. W. Stockberger; report on histological nomenclature, Profs. E. L. Newcomb, A. Schneider, H. W. Youngken, E. H. Wirth, E. N. Gathercoal.

New German Pharmacopœia compared with U. S. P. X, Prof. E. H. Wirth.

Pharmacology and Plant Physiology, Prof. A. H. Clark, Dr. H. McGuigan, Dr. E. H. Vollweiler.

Round table on teaching of Pharmacognosy, led by Dr. A. Hogstad.

Botanical excursions, led by Dr. H. H. Rusby, Dr. A. Viehoefer, Dean Day.

DIAMOND JUBILEEE MEETING AMERICAN PHARMACEUTICAL ASSOCIATION—The seventy-fifth annual meeting of the American Pharmaceutical Association will be held in St. Louis, Mo., the week of August 22d to 27th, 1927. The St. Louis Committee of Arrangements, under the active leadership of the local secretary, Mr. A. W. Pauley, are rapidly perfecting their plans for a meeting which will be notable among the long list of these meetings as to the business meetings and the entertainment features.

They have chosen the Coronado Hotel as the official headquarters and every one may be assured of good accommodations.

The program is being completed and details will be furnished within a short time. Mr. Pauley and his associates are experienced in handling a convention of this character and make it a point that it is conducted in strict accordance with the program as to time and place.

ANTI-SNAKE-BITE SERUM NOW AVAILABLE—The first license ever granted for the production and interstate sale of the Anti-Snake-Bite Serum in this country was recently issued by the Treasury Department, at Washington, upon recommendation by the United States Public Health Service.

The license was issued April 25, 1927, and marks the culmination of some ten months' intensive work on the part of Dr. Afranio do Amaral—A Brazilian authority on snakes, snake venoms and anti-

venins—whose leave of absence from his official position has been extended to permit him to undertake the development of Anti-Snake-Bite Serum in this country.

Antivenin (*Nearctic Crotalidae*), as the new product is named, is a concentrated, polyvalent serum, effective against the venoms of the principal poisonous serpents of the family Crotalidae, to which the rattlesnakes, mocassin and copperhead belong. It is supplied in 10 cc. syringes—10 cc. having been found sufficient to cure the effects of snake bites in practically all cases. We understand that the serum has excellent keeping qualities and will be issued under a five-year dating.

It is interesting to note that Dr. Amaral and other authorities on snake bites regard the oft-recommended permanganate as of practically no value, as ordinarily used. If applied in concentrations strong enough to neutralize toxins, it has an injurious effect on the tissues. Furthermore, alcohol and like stimulants are regarded as positively injurious, in that they only serve to hasten the distribution of the venom throughout the body.

It will be a great satisfaction, therefore, to physicians and druggists to know that they can now supply to campers, tourists, fishermen, hunters and summer vacationists, a real protection, in the form of a handy little package containing a syringe of anti-snake-bite serum and glass-encased sterile needle, with plain directions for use so written that even a layman can apply the remedy if necessary.

A package of antivenin should be included in every first-aid kit. The insurance value of having this remedy on hand in case of need is itself worth the price of the package. If further information is desired, the reader is invited to correspond with the H. K. Mulford Company, Philadelphia, Pa.

BOOK REVIEWS

EMINENT CHEMISTS OF OUR TIME, by Benjamin Harrow, Ph.D. D. Van Nostrand Company, Inc., New York. 471 pages with index. $3.00.

This is the second edition of a work which was first issued in 1920 and which has become a classic in the literature of the history of chemistry.

The format of the second edition is different from that of the first. The page size has been increased somewhat and more than two hundred pages of entirely new material have been added. The first portion of the book has not been changed and consists of biographical sketches of eleven individuals "whose work is indissolubly bound up with the progress of chemistry during the last generation or so."

The second portion of the book is entirely new and is in conformity with the original plan of the author to publish a book in which one part should consist of the "lives" and the other part of the "work" of the individuals. This original intent was not consummated in the first edition, which was intended more as a popular volume than as a reference book. The addition of this second portion is a great advantage to the book. It is true that it is more difficult reading for the student, but the inspirational value of the book is directly enhanced and the purpose of the book gains greater opportunity of fulfillment.

No book can be expected to be entirely free from errors. Errors in first printings may be pardonable, but the same errors in second printings must be ascribed to either indifference, carelessness or ignorance. A few errors of this class are noted. On page vi and also on page 16 the initials of Dr. H. W. Wiley are reversed. On page 198 "Huguenots" is spelled "Hugenots," and on page 225 "Hofmann" is spelled "Hoffmann." These are not serious errors, but are somewhat of a reproach to a scholar as meticulous about such matters as Dr. Harrow.

One inconsistency of statement is noted and one incorrect statement. On page 208 the author, referring to saccharin, mentions that it is five hundred times as sweet as sugar. On page 430 an editorial note concerning the same substance states: "As a matter of fact it is between three to four hundred times sweeter than cane sugar."

On page 208 the author states concerning saccharin: "In spite of the more than 100,000 carbon compounds that have been prepared, no substance similar to it in sweetness has ever been unearthed." This sounds somewhat in the style of newspaper chemistry, for surely Dr. Harrow has heard of para-phenetol-carbamide, which is better known as Dulcin or Sucrol, which is nearly as sweet as saccharin. This has been known for some years and is mentioned in legislative enactments prohibiting artificial sweeteners.

The article on Dr. Remsen might have been made more complete and interest added, too, by referring to the government rulings regarding saccharin, for the Referee Board headed by Dr. Remsen issued a statement, supplementing the work on sodium benzoate and on alum, both of which are referred to by Dr. Harrow, advising against the indiscriminate use of saccharin as a sweetener in foods and beverages, and it is now prohibited in all classes of foods and drinks.

These minor defects, however, do not detract from the value of the book as a whole and in its new form it will find a welcome in every library and be read with interest and enjoyment by every one who reads books of this type.

CHARLES H. LAWALL.

A TEXT BOOK OF PHARMACOGNOSY. By Heber W. Youngken, A.M., Ph.M., Ph.D., Professor of Pharmacognosy and Materia Medica in the Massachusetts College of Pharmacy, Boston; Member of U. S. P. Revision Committee; editor of the Section of Pharmacognosy and Pharmaceutical Botany of Biological Abstracts; Botanical editor of the U. S. Dispensatory; author of "Pharmaceutical Botany," etc. Second edition. Revised and enlarged with 301 illustrations containing about 600 figures. 700 pp. cloth, $6. P. Blakiston's Son & Co., 1012 Walnut Street, Philadelphia.

The second edition of this well known book based upon U. S. P. X and N. F. V. is now before us. Part I comprises Morphologic Considerations of Drugs, divided into Chapter I, Fundamental Considerations and Chapter II Morphological Considerations of Crude Vegetable Drugs.

Part II is devoted to Taxonomic Considerations of Drugs and is composed of Chapter I, Crude Drugs of Vegetable Origin, and Chapter II, Crude Drugs of Animal Origin.

Part III contains Micro-Analytical Methods with the following divisions: Microanalysis, Quantitative Microanalysis, Microchemical Tests and Optical-Crystallographic Methods.

Bibliography occupies an entire page and the very complete index comprises 36 double column pages. I must not forget to mention the Historical Chapter, pp. 11 to 15, which will be greatly appreciated by students and lovers of History of Pharmacy.

The book is a master work, not only a systematic text book for students, but also a valuable reference book for pharmacists.

OTTO RAUBENHEIMER, Ph.M.

CHAUCER AND THE MEDIAEVAL SCIENCES. By Walter Clyde Curry, Professor of English, Vanderbilt University. 267 pp. $2.50. Oxford University Press, 35 West Thirty-second Street, New York City.

The book before us is the result of a research of eight years, to follow the English poet Geoffrey Chaucer (1340-1400), in his studies of the mediaeval sciences and to indicate with what degree of success he has employed scientific materials in the creation of his poetical works. It must be remembered that Chaucer was first a poet and secondarily a philosopher or a scientist.

Among the nine chapters of the book, the most important to pharmacist, physician and chemist is "The Doctor of Physic and Mediaeval Medicine," pp. 3 to 36. The following quotations will prove how interesting this part is: "For years he and his apothecaries have worked together in brotherly fashion—to their mutual benefit—against the ravages of the Black Death and other diseases; and such have been his thrift and temperance that he is blessed with superior physical comforts in the way of good health and distinctive wearing apparel." "His thinking is but little of the Bible." "The physicians foresee and declare the causes of sickness, and lay down its beginning, its continuance and its decline. What more shall we say? When I hear them talk, I fancy they can raise the dead and are in no way inferior to Æsculapius or Mercury." "He prescribes new medicines twice a day or oftener, making an apothecary shop in the patient's house, planting the cupboards and windows with glasses and galley-pots, and not a quarter of all is made use of."

In order to fully appreciate this book it must be read! Prof. Curry deserves credit for his painstaking research.

OTTO RAUBENHEIMER, Ph.M.

VOLUMETRIC ANALYSIS FOR STUDENTS OF PHARMACEUTICAL AND GENERAL CHEMISTRY. By Charles H. Hampshire, B.Sc. Fourth edition. $1.75. P. Blakiston's Son & Co., Philadelphia.

This book containing 125 pages of subject matter and 4 pages of single column index, printed in Great Britain, contains 13 chapters divided as follows: One introductory chapter, one chapter on Indicators, four on Acidimetry and Alkalimetry, four on Oxidation and Reduction Reactions, two on Precipitation Reactions, and one on Miscellaneous Exercises.

The aim of the book is said to be to "present a sufficient course of instruction to enable the beginner in chemical analysis to gain a working knowledge of volumetric methods without any wide excursions into the domain of chemical theory." Though the text is couched in language easily enough understood to make it possible for a student with a considerable knowledge of chemical theory to follow it easily and to carry out the processes given, the worker who does not have that knowledge will not find here all, or anywhere near all, he needs to make of himself an intelligent analyst, even along the lines indicated by the scope of the book. It does not by any means furnish a short-cut for a would-be volumetric analyst who is deficient in preliminary theoretical training. To those who have a good foundation in general theoretical chemistry the book would appear to be a very useful guide to volumetric processes of analysis. In addition to general processes it gives briefly processes for the analysis of chemicals recognized by the British Pharmacopœia, but so many of these are recognized by the United States Pharmacopœia that the volume should be of use to the American worker.

F. P. S.

ANLEITUNG ZUR ERKENNUNG UND PRUEFUNG DER ARZNEIMITTEL DES DEUTSCHEN ARZNEIBUCHES VON DR. MAX BIECHELE. Auf Grund der sechsten Ausgabe des D. A. B. neubearbeitet von Dr. Richard Brieger, Apotheker und Redakteur an der Pharmazeutischen Zeitung. 15. Auflage. 760 pp. Verlag Julius Springer, Berlin W. 9.

If a book, as the one before us, is in its fifteenth edition it is a true testimonial of its great value and immense popularity. Although Apotheker Dr. Max Biechele died in 1922 his masterwork continues to

live. Owing to the publication of the new, sixth edition, of the German Pharmacopœia, a revision of the "Anleitung" became a necessity and the revisor Dr. Richard Brieger, Apotheker and Editor of the Pharmazeutische Zeitung, well known in pharmacy throughout the world, solved the problem in an excellent manner.

The chapter on General Methods runs from pp. 14 to 41. The monographs of the D. A. B. VI occupy the principal part of the book, namely pp. 42 to 708. Both tests of identity and tests for impurities as well as miscroscopic examinations, are given and arranged in a very clear manner so that the apothecary as well as the inspectors can easily apply these tests. It should be remembered that in the "Fatherland" the inspection of pharmacies is in charge of special committees composed of pharmaceutical and medical authorities, who make the tests on the premises.

Owing to its clearness and compactness the book will also be of good service in the laboratory of the American pharmacist and chemist.

OTTO RAUBENHEIMER, Ph.M.

ONE HUNDRED AND ONE LEGENDS OF FLOWERS. By Elizabeth Todd Nash. Illustrated. 340 pp. Octavo. Cloth, $3. Christopher Publishing House, 1140 Columbus Avenue, Boston, Mass.

In gathering together the charming and instructive legends about flowers, the author has produced a book that can hardly fail to appeal to readers of every age and all classes, including pharmacists and physcians, quite especially as many flowers are included which are used in medicine, as for instance: Clover Legends (German, Indian and Jewish), Crocus (Greek), Elder (Danish and Scandinavian), Lily-of-the-Valley (English, French and Jewish), Marigold (Greek, Mexican and Breton), Roses in History, Rosemary (Spanish), tea (Japanese) and Violets in History. Besides the volume contains: List of Names of the Principal Gods and Goddesses in Greek and Latin, Odd Names of Flowers Growing in the Atlantic Division of the United States and a Bibliography.

It is a book which every pharmacist can be proud of to have in his library.

OTTO RAUBENHEIMER, Ph.M.

THE NEW MEDICAL FOLLIES. By Morris Fishbein, M.D., editor of J. A. M. A. and of Hygeia. 12 mo. 235 pp. Cloth, $2. Boni & Liveright, Inc., 61 West Forty-eighth Street, New York City.

The subtitle of the book is: An Encyclopedia of Cultism and Quackery in the United States with Essays on the Cult of Beauty, the Craze for Reduction, Rejuvenation, Eclectism, Bread and Dietary Fads, Physical Therapy and a Forecast as to the Physician of the Future.

Chapter VII, "The End of Eclectism," is good reading, but the reviewer begs to differ with the author in the classification of eclecticism as a folly or quackery. Far from it! The eclectics, as well as the homeopaths serve the suffering public equally as well as the "regular" physicians. Pharmacy and medicine should be forever thankful to the old eclectics for the introduction of such valuable medicines as Lobelia, Scuttelaria, Echinacea, etc., still official in U. S. P. and N. F. After all, which are the best and safest remedies: the herbs and roots, nature's remedies or the products of the tar barrel, the heart depressing coal tar derivatives? In the opinion of the reviewer and many others, nature's remedies are being used more and more, ever since the war.

"The New Medical Follies" is a companion volume to "The Medical Follies" now in its seventh edition.

OTTO RAUBENHEIMER, Ph.M.

LABORATORY MANUAL OF QUALITATIVE CHEMICAL ANALYSIS. Fourth Edition. By Theodore J. Bradley, A.M., B.S., Ph.G. Dean and Professor of Chemistry in the Massachusetts College of Pharmacy. Lea & Febiger, Philadelphia, 1926. Bound in cloth, 184 pages. $2.25.

This book is especially prepared for students in pharmacy. The first part contains a brief discussion of the elementary theory of chemistry. Metals are next considered with a general outline of their separation into seven groups. Then metals of each group are discussed and a scheme of analysis for them set forth. This system gives a gradual progression for the student leading finally to a table composed of the entire seven groups. The acids of interest of students in pharmacy are next studied, arranged in three groups according to their behavior with silver nitrate and barium chloride test solu-

tions. Under the tests for salts of nitric acid, the impression is given that the brown ring observed, is due to the formation of ferric sulphate, whereas it is really a solution of nitric oxide in the ferrous sulphate solution.

The latter part of the book is taken up with the examination of official substances, following the methods of the U. S. P. X and N. F. V. Reagents and Test Solutions are considered also in this part and many of these are the same strength as in the U. S. P. X. Students, even those having very little previous chemical education, should with some laboratory instruction, be able to study qualitative chemistry from this book with comparative ease and show good progress.

C. C. PINES

REMINGTON'S PRACTICE OF PHARMACY. Seventh Edition. By Cook and LaWall. J. B. Lippincott Company, Philadelphia, U. S. A. Bound in cloth, 2090 pages, 800 illustrations. $10.

This book is a work of magnitude and great practical value. It contains a wealth of information intended for use of pharmacists, physicians and students which is hardly comprehended by its title. The scope is unique, presenting as it does not only the subject matter common to previous editions and other treatises on the practice of pharmacy, but also a painstaking exhibit of the every day needs of pharmacists in pursuing the multifarious activities of their calling.

The strictly technical matter of the former edition has been carefully revised, enlarged and elaborated in accordance with the progress in recent years. All changes, new methods and processes are clearly explained and in a manner which is at once gratifying to the reader. The pharmacist who long since closed the door of the college of pharmacy behind him for the last time, will find the book an efficient aid for bringing his technical knowledge up to date.

The chapter on Biologicals and that on The Pharmacist in Community Health Service, which includes such topics as "Household pests and their elimination," "Disinfectants," and "Assistance the pharmacist can render public health service," are among the many valuable new features of this edition. They furnish a much needed means of perfecting the knowledge of the pharmacist in this important professional relation.

The treatment of the historical, legal, financial and commercial phases of the drug business exhibits a vision and thoughtfulness for

making the book of unsurpassed usefulness in the daily routine of the pharmacist, which only writers of wide and varied practical experience in teaching and in the conduct of pharmacies could possibly conceive.

Other useful features which may be mentioned are the two glossaries. One on Uncommon Pharmaceutical and Technical Names, the other on Medical Terms. An improvement is observed in the publication of the work in a single volume, which expedites reference to the contents and makes its use otherwise more convenient.

The authors had the assistance of two score or more specialists and distinguished practical pharmacists in producing various chapters, so to them as well as to the authors, the merits of the book must, in fairness, be credited. The result of their joint labors is a work which may without exaggeration be pronounced a comprehensive guide to modern pharmaceutical service.

As a textbook for study and reference, and aid in solving the many and varied questions which arise daily for the pharmacist this work will be found indispensable and should be made a part of the equipment of every pharmacy.

LUCIUS L. WALTON.

A FACSIMILE OF THE FIRST EDITION OF THE PHARMACOPŒIA AUGUSTANA. With Introductory Essays by Theodor Husemann. Published by the State Historical Society of Wisconsin. Small folio, over 100 pages, including photographic reproductions of the title page, text, and manuscript notes of the Augsburg Pharmacopœia of 1564.

It is an unusual undertaking for a state historical society in this country to publish a work whose historical interest is restricted to a small group of readers, as in this case. This is made possible by a special fund known as the Hollister Pharmaceutical Library Fund of the State Historical Society of Wisconsin. The fund was established in 1914 and the present volume is the first one that has been issued by its aid. An explanatory preface is furnished by Joseph Schaefer, Superintendent of the State Historical Society. The editorship of the volume and the translation of the Introductory Essays by Theodor Husemann were both undertaken by Dr. Edward Kremers, Director of the Course in Pharmacy in the University of Wis-

consin, whose qualifications and predilections for pharmaceutical history eminently qualify him for such work.

The book is a valuable contribution to the history of pharmacy. The Introductory Essays are written in an interesting style and discuss many characters of importance including Valerius Cordus, Adolph Occo, and Raymond Minderer.

The photographic reproduction of the nearly 300 pages of the text of the Augsburg Pharmacopœia of 1564 shows an interesting collection of formulas of about the same general character as those exhibited in the work of Valerius Cordus, which had been adopted by Nuremberg about twenty years before. Most of the formulas bear the name of the authority from which they were taken and we meet the names of Galen, Mesue, Rhases, Avicenna, Alkindus, Nicholas of Salerno, Nicholas of Alexandria, and a number of others. The recipes are preceded by the modern sign ℞. Weights and measurements are not given in symbols and numerals but are spelled out in full. The book needs to be seen, handled and studied to be properly enjoyed. It should find a place in every pharmaceutical library of importance.

C. H. LaWall.